

1920—Our Twenty-Fifth Anniversary—1945

Contractors and Engineers Monthly

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Covering the Field

Airport Grading

Drainage during construction was the major problem to be solved in the contract for the grading and base course of a new 1,704-acre airport in the middle west (page 1).

Bituminous Paving

Two examples of road improvement with new bituminous surfaces appear in this issue: one, a 16-mile retread job on which a traveling plant was used (page 1); the other, a hot-mix surface for an old concrete road, on page 93.

New Concrete Bridge

The width of an existing bridge was doubled by the construction of a new reinforced-concrete span alongside the old one, to accommodate a new dual highway. See page 2.

County Road Work

Problems confronting county engineers are varied and sundry. Some of them, including the need for many bridges and culverts, use of local materials as road metal, and limited funds for the work, in two of our counties are discussed on pages 2 and 63.

Dredging River Channel

The contract for dredging an 11-mile stretch of river, and the clamshell and hydraulic dredges which did the job, are described in detail in a pair of articles on page 6.

Highway Maintenance

A type of bituminous resurfacing known as drag retreatment, because of the part played by a drag broom, is used successfully for road improvement in North Carolina. See page 11.

Aggregate Production

The production of aggregate is the first step in many types of construction. An unusual plant set up by the Seabees to convert coral rock to aggregate for runways and roads on an island in the Pacific is described on page 29.

Snow in Summer?

A cooling thought, but there's more to it than that. Serious thought and preparation now for those snow storms of next winter will pay real dividends in increased efficiency and fewer headaches when winter comes. See page 43 for some hints.

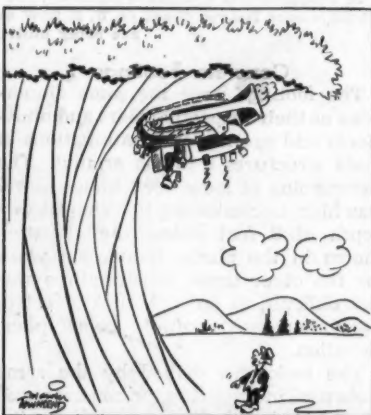
Equipment Depot

An unusually spacious and well equipped state highway department depot for the care of its machines, and how they are meeting wartime problems are described on page 68.

Plans for Post-War Work

Various phases of the planning for post-war construction of highways and other public works are discussed on pages 37, 54, 72, 75, 82, and 95.

(You will find "In This Issue" on page 4)



Grading and Base For New Runways

Underground Watercourse Provides Drainage During Construction of Three Runways and Taxiways

By FRANK B. SARLES,
Western Field Editor

✦ EACH new construction job brings its own peculiar problems; the ability to turn liabilities into assets makes a successful contractor. An example of this occurred in the construction of a new 1,704-acre airport at Waterloo, Iowa, where carrying area grading and shoulders to approximately finish grade seriously interfered with natural drainage during construction of the subgrade. The grading contractors discovered a natural subdrainage system and utilized it successfully to solve this problem.

The new airport has three runways, N-S, NW-SE, and E-W, all 150 feet wide and 5,400 feet long, and connecting taxiways 50 feet wide, with graded side slopes, not exceeding 1 per cent, carrying surface water to a storm-drainage system through drop inlets covered by grates 31 x 43 inches in area, built of 2 x 6-inch lumber. The subgrade was compacted to a modified Proctor density of 95 per cent under runways and

(Continued on page 16)

New Retread Top For 16-Mile Job

A 2-Inch Sand-Asphalt Surface Mixed in Place by Traveling Plant on Old 6-Inch Road-Mix

✦ AN old 6-inch sand-bituminous road-mix pavement which had become cracked and wavy since its construction in 1931-32 was recently given a sand-bituminous retread surface 20 feet wide and about 2 inches thick by the Smith Engineering & Construction Co. of Pensacola, Fla., under contract with the State Road Department of Florida. This new surfacing, which was mixed in place by a Wood Roadmixer on top of the existing road, is on Fla. 53 and 10, beginning at the southerly end of the 3-mile bridge crossing Pensacola Bay and continuing eastward as part of the Coastal Highway in the direction of Fort Walton.

Ordinarily this method of laying a surface with a road machine is a speedy process, but this job, which was started in September, 1944, was not finished until February, 1945, because of cold weather. Furthermore, some sections of it had to be reworked this summer. Florida State Road Department specifications require a temperature of 75 degrees F for this type of work in order to get a thorough mixing of the sand and asphalt, but winter temperatures in northwestern Florida do not mount to

(Continued on page 60)

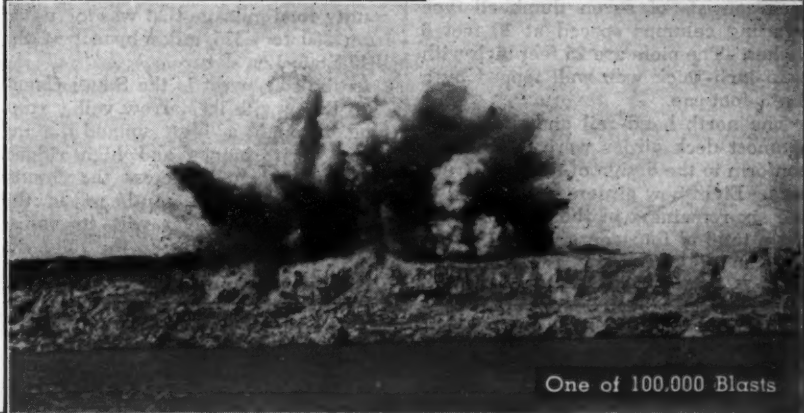
SEABEES IN THE PACIFIC (See article, page 29)



Coral Rock for Aggregate



Blast-Hole Drilling



One of 100,000 Blasts



Crushing, Screening, and Stockpiling



Loading Out for Runways and Roads

Concrete Span Built For Dual Highway

Addition to the Existing 117-Foot Structure Widens 40-Foot Roadway to 86 Feet; Truck-Mixers for Concrete

WHEN a 22-foot concrete roadway was added to the existing 20-foot concrete road, making U. S. 25W and Tenn. 9, northwest of Knoxville, into a dual highway to improve traffic conditions on this industrial access route, an existing bridge was widened to remove any possible danger of a bottleneck. Although the old bridge had a 40-foot roadway, Tennessee highway engineers decided to increase this width to 86 feet by widening the structure, rather than run a 42-foot highway onto a 40-foot bridge.

Accordingly, as part of the contract for 7.4 miles of 22-foot concrete pavement constructed by Foster & Creighton Co., of Nashville, Tenn., from the Knoxville city line westward to the boundary of Anderson County, the reinforced-concrete deck-girder bridge located 1½ miles from the west end of the project had an addition built alongside it. The existing bridge, which was built in 1930, had three spans of 39 feet for a total length of 117 feet and crosses Beaver Creek at a skew of 60 degrees. The new bridge has the same length and is of similar construction.

Foster & Creighton Co. sublet the construction of this bridge and a double 10 x 6-foot reinforced-concrete culvert to the Alley Construction Co. of Bristol, Va., which began work on the Beaver Creek structure last autumn.

New Bridge

The existing three-span bridge rests on two abutments and two piers, the main channel of the creek flowing between the two piers in a southerly direction. The piers and abutments are doubled in length to 156 feet by the new construction. As the addition to the bridge was being built on the north side, the northern wing walls on the two abutments were removed. The abutments are the counterfort type, 22 feet 9 inches high and 1 foot thick, with a section through the bottom measuring 13 feet 6 inches. A 15-foot wing wall was added to the north side of the west abutment, and a 10-foot wing to the north side of the east abutment. Each pier consists of seven dumbbell-type tapering columns spaced at 19 feet 6 inches. The piers are 25 feet high with a 15-inch-thick web wall topped by a 3 x 3-foot cap.

The north hand-rail and the northernmost deck girder were removed to conform to the design of the new structure. Eight new girders were added to the six remaining in the bridge, making a total of fourteen girders, 1½ feet wide and 2½ feet deep, spaced at 7 feet

3 inches. Supported on the girders, over the three 39-foot spans, is an 8-inch reinforced-concrete slab which is also the surface of the roadway. The bridge is designed for an H-20 loading.

Preparation for New Work

The north girder and hand-rail were removed for the length of the structure with one Thor and two Worthington jackhammers operated by a Chicago Pneumatic 205-cf air compressor mounted on a four-wheel trailer. Holes were also driven with this same equipment in the north ends of the existing piers and abutments for expansion bolts to tie the new concrete to the old.

Footings for the two piers were constructed last autumn when the contractor took advantage of low water to build small cofferdams for the foundation work. Both abutments and piers rest on solid rock which covers part of the creek bed in this area. When working on pier 2 on the west half of the bridge, the contractor diverted the flow of water from the main channel between the piers by building a small dam north of the bridge so that the water would flow between pier 1 and abutment 1 under the east half of the bridge. This dam was just a low wall of earth built up by a Koehring 302 crane equipped with a 45-foot boom and a ¾-yard Blaw-Knox clamshell bucket. The crane ran along the bed of the creek close to the west bank from which the earth was obtained.



C. & E. M. Photo

To accommodate a widened highway, the 117-foot reinforced-concrete deck-girder skew bridge over Beaver Creek on U. S. 25W and Tenn. 9 was doubled in width. Here forms are being built for abutment No. 2.

Concrete Footings

The footings have the same dimensions as their respective piers and abutments and are merely continuations of these structures into the ground. The outcropping of loose rock under pier 2 was high, necessitating its removal to a depth of 9 feet below the elevation shown in the plans; foundation work for the other three substructures was less difficult, as only about 1½ feet of excavation was required below plans elevation.

The rock was drilled by the same tools used in removing the concrete, and was blasted with 40 per cent dynamite. Solid cofferdams were built of 6 x 6-inch timbers set vertically 3 feet apart around the pier location, and built up with 1-inch rough sheeting, 10 or 12 inches wide. The inside of these cof-

ferdams was braced in both directions with other 6 x 6-inch timbers placed so as not to interfere with the setting of the forms for the footings. As the footings were poured, these braces were either knocked out or sawed in two when they were no longer needed.

Despite the diversion of the main flow of the creek from the vicinity of the cofferdam, water in great quantities seeped in through crevices in the rock, requiring an imposing battery of pumps to keep the structure unwatered. The pumps used included two LaBour, a 4-inch and an 8-inch; three CMC pumps, two 4-inch and one 2-inch; a Marlow 5-inch pump powered by a Wisconsin engine; and a Rex 3-inch pump.

Form Work

Forms for the piers and abutments were made in 8 x 10-foot panels from ¾ x 6-inch boards, with tongue-and-groove joints, and backed by 2 x 4-inch studs spaced on 1-foot centers. These in turn were supported by double 2 x 4-inch wales spaced at 3-foot centers. The panels were placed in position and braced every 10 feet with 2 x 8's which were anchored to 6 x 6-inch timbers buried in the ground. Rigidity was imparted to these braces by connecting them with 2 x 4's both laterally and longitudinally.

No plywood could be obtained for building the cylindrical forms for the dumbbell-type piers so ¾ x 6-inch boards were cut vertically into 2-inch strips by a 6-inch electric Skilsaw. These thin strips were then shaped to the proper size of form and gave excellent results. Boards used in the form work were smoothed by a Black & Decker 9-inch flexible heavy-duty disk sander.

(Concluded on page 99)

Topography Controls County Road Program

Three Rivers and Dividing Ridges Provide Sources of Road Metal; Many Bridges And Culverts Needed

By C. W. SIMONDS, County Surveyor and Engineer, Blaine County, Oklahoma

WIDELY varying topography is characteristic of Blaine County, Okla., as it extends across the level valleys of three rivers with rugged upland areas. It contains 936 square miles, with a county road mileage that was increased from 360 to 1,375 miles by act of the 1940 State Legislature.

In the southwest is the South Canadian River with its narrow valley running through a high upland having many deep ravines and high ridges. Flowing diagonally across the county from northwest to southeast is the North Canadian River with its valley floor sloping gently up to the ridge dividing it and the valley of the South

Canadian River. The ridge between the North Canadian and the Cimarron River, which touches the northeast corner of the county, is a series of eroded hills or escarpments which are cut into many deep rugged canyons by small streams, tributaries of the Cimarron. This formation is known locally as "The Gypsum Hills", and on some maps is indicated as the Chautauqua Mountains. In this section the Blaine formation 50 feet thick, composed of three strata of gypsum of varying thickness, interspersed between layers of red shale, is exposed.

Many streams flow from springs in the Gypsum Hills. One especially large spring, 5 miles north of Watonga, with its surrounding hills has been established as a resort known as Roman Nose State Park, named after a Cheyenne Indian Chief whose allotment was included in the park of 520 acres.

West of the North Canadian River is an eastward-sloping plain ending in the bottom of the North Canadian valley. It also has been cut in deep ravines by the tributaries of the river. About 9 miles south of Watonga, the county seat, near the town of Greenfield, are the Red Hills, a series of very prominent red bluffs or buttes capped with a stratum of white and pink dolomite rock 18 inches to 3 feet thick. This rock is very hard and is excellent for coarse aggregate in concrete. The County had a crushing plant in operation on one of these hills, and has used the rock to make concrete and stone culverts in various parts of the county.

The greater part of the upland west of the North Canadian is a sandy terrain on which are growing scrub timber, "shin" oak, and blackjack oak. It has a subsoil of red clay or shale. In grading roads through this country, the grader men try to cut the ditches deep

(Continued on page 23)

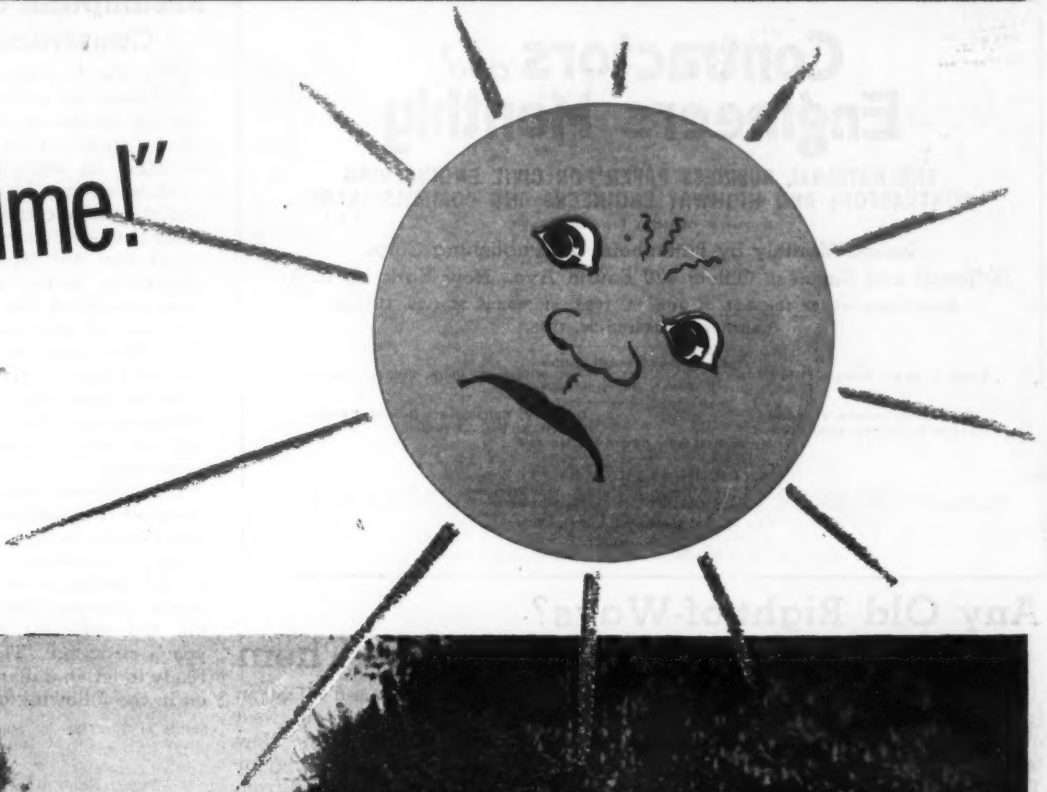


Patrol graders play an important part in maintaining the earth and gravel roads in Blaine County, Okla. Here a leaning-wheel grader cuts into the bank to crown up one of the dirt roads.

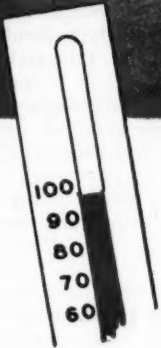


Low-water bridges are a feature of Blaine County's road system, the one over Salt Creek, shown above, being the longest. With a culvert in the center to accommodate normal stream flow, three concrete slabs carry traffic over the streambed. Floods pass over the entire structure, without damage.

"I'm wasting my time!"



Texaco Asphaltic Concrete pavements, such as this one in Ohio, are unaffected by extremes of temperature.



"Old Sol" can shoot his hottest shafts earthward, sending the thermometer up into the nineties, but 40 summers have taught him one lesson—

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TEXACO ASPHALT

Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING
CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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Frank B. Series, Western Field Editor Theodore Reed Kendall, Editor William H. Quirk, Eastern Field Editor
Olive E. Potter, Managing Editor

Edgar J. Buttenheim, President Donald V. Buttenheim, General Manager
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Any Old Right-of-Ways? Buy Them, Save Them, Use Them

If there are any old right-of-ways lying around loose near you, look them over and see how you might use them in your planning for future highways. The number of abandoned canals, railroads, street-car and interurban lines in this country is tremendous in mileage. The old canals offer the most level, and generally the straightest, right-of-ways, followed by the railroads and finally the old "trolley" lines.

Years ago Schenectady, N. Y., converted a section of an old barge canal through the heart of the city into a depressed highway of great value to traffic. Today the post-war plans for Chicago's traffic problem include the use

of the abandoned Illinois and Michigan canal bed for the proposed southwest toll route. A bill is now in the New York State Legislature, providing for the construction of a new road from Gasport to Middleport, in the western section of the state, over the abandoned right-of-way of the Rochester, Lockport & Buffalo Railway. This right-of-way is entirely south of the New York Central Railroad, thus eliminating crossing of the tracks between the two communities.

There are other examples, but have you given serious consideration to using any old right-of-ways that have been abandoned around your way?

To By-Pass or Not to By-Pass And the Question of Control

The pendulum has swung from the extreme of carrying all main highways around cities to plans for wide expressways to facilitate both local and long-haul traffic by carrying it right to and through the heart of the metropolis. The early idea of by-passing cities seemed logical, since it took that great volume of through traffic off Main Street so that local traffic could park close to the stores. It required a careful series of traffic studies by the Public Roads Administration to get out of our heads the notion that most traffic on our highways was destined for some far-off place. They proved definitely that most traffic had the nearest city as its terminal, so that the by-pass served but a small fraction of the total highway traffic.

We must not consider eliminating the by-pass entirely, because it does serve

a useful purpose for that small fraction whose destination is beyond a particular city. Many existing by-passes, unfortunately, have become obsolete, ineffective, and actually dangerous because of the failure of state legislatures to furnish adequate laws for limiting the access to through highways, or failure of designers properly to restrict the access to the by-pass. The result has been that businesses, residential development, and industries have grown up along many of our existing by-passes to pour new heavy local traffic indiscriminately into the by-pass, creating multiple hazards and interrupting the smooth, safe flow of traffic.

This is another argument for increased attention on the part of state legislatures to the passage of bills limiting the access to expressways and all through highways.

Detours Mean Progress

In the days when road building was booming throughout the length and breadth of this land, there were many stories about detours. Remember the one about that Frenchman, "DeTour", who was building so many roads? Long may "he" live and carry us around contract after contract for wider, easier-riding highways!

It is a bit discouraging when such a widely read and usually forward-looking newspaper as the *Christian Science Monitor* views the period of highway construction ahead in these depressing words:

"What of the months when the old roads will be torn up and the new ones still a wilderness of steam shovels and tar pots? That is a period we would rather not contemplate. For, if memory does not fail, it will involve detours and long lines of traffic slowed up by that lamentable practice of putting all but one lane of a road under construction.

It will mean hours of patient creeping amid exhaust-filled vapors, while we crane fruitlessly ahead for signs that it will ever move again.

"Having examined the extent of the holes in the roads this spring, we hope we have strength enough to stay right at home until about 1947."

It has evidently never occurred to the editorial writer of the *Christian Science Monitor* that detours mean progress. Would he prefer leaving our roads "as is" and have no detours? He would then be hibernating long after 1947. The temporary discomfort of riding over a detour, or even along that one lane left open on the job, is small for those who are obliged, because of business, to ride over bumps and holes, as compared to the tremendous benefit to society as a whole from the project being completed. Detours will always mean progress to those who can see beyond the traffic immediately in front.

Resumption of Road Construction in Sight

The War Production Board is easing restrictions on civilian activity as rapidly as conditions permit, and it has already modified the regulation on construction in order that grading and earth work may be carried on without limitations. According to the American Road Builders' Association, it is anticipated that not later than September Regulation L-41e will be rescinded, thus permitting the post-war highway construction program to swing into action. This would not materially affect the 1945 construction season, but will provide ample time to arrange for the 1946 program. The size of that program will, of course, depend on existing war conditions.

It is therefore nearly time to take the plans off the shelf and get to work. The question is, how many states will be ready? According to figures obtained by the AREA, as of May 1, 1945, only seven states and the District of Columbia had sufficient plans for the first year's program. The status of plans ready to let, in dollars and miles, is given in the following tabulation:

Status of Planning by State Highway Departments
(as of May 1, 1945)

	Projects Ready to Let May 1, 1945	Federal-Aid Apportionment	Total Federal-Aid and State Funds
	Miles	Dollars	
In Thousands of Dollars			
Ala.	175	\$ 5,000	\$ 9,751
Ark.	164	6,000	5,731
Calif.		71,388	22,336
Colo.	248	11,460	7,701
Conn.	138	15,400	4,148
Del.	87	3,800	2,033
Fla.	133	8,214	7,005
Ga.		4,174	11,587
Idaho	58	2,634	4,938
Ill.	260	23,000	23,189
Ind.	225	16,500	12,116
Iowa			11,173
Kans.	750	20,600	10,738
Ky.	60	7,324	8,910
La.	81	7,607	7,417
Maine	104	5,800	3,916
Md.	56	7,950	4,803
Mass.			10,377
Mich.	193	16,000	16,584
Minn.	1,030	22,000	12,442
Miss.	no estimate possible		7,976
Mo.	297	8,023	14,394
Mont.	200	8,000	7,961
Nebr.	690	8,565	8,428
Nev.	109	3,410	4,854
N. H.	11	1,304	2,306
N. J.	75	25,000	9,464
N. M.	123	3,715	6,406
N. Y.	715	100,700	33,994
N. C.	229	7,960	11,373
N. Dak.	163	5,094	5,988
Ohio	320	23,000	20,143
Okl.	250	12,000	10,171
Oreg.	250	12,000	7,090
Pa.			25,044
R. I.	23	3,000	2,957
S. C.	1,082	19,500	6,220
S. Dak.	550	5,750	6,268
Tenn.		2,000	10,035
Texas	2,095	65,000	28,775
Utah		3,000	4,654
Vt.	24	2,850	2,015
Va.	330	17,000	8,802
Wash.	180	9,000	7,415
W. Va.	181	8,339	5,360
Wis.	400	15,000	11,753
Wyo.	200	5,000	4,832

Heavy-duty truck and bus tires will continue in tight supply, despite some improvement in availability of smaller-size commercial-vehicle tires. Care of present tires therefore is essential.

In This Issue

Aggregate Production	29
Airports	1, 42
Bituminous Paving	1, 11, 93
Bridges	2, 84
Care of Equipment	45, 87
Concrete Construction	2, 22
County Road Work	2, 63
Dredging	6
Editorials	4
Equipment Shops	35, 68
Erosion Control	41
Flood Control	6, 77
Highway Maintenance	11, 27
Legal Decisions	80
Pipe Line to China	50, 51
Plans for Post-War Work	4, 37, 54, 66, 72, 75, 82, 95
Portraits in Print	7
Roadside Development	18, 72
Seabees	29
Snow Removal	43

Island Intersection As a Safety Measure

To the Editor,
CONTRACTORS AND ENGINEERS MONTHLY

The article which appeared in the April issue of *CONTRACTORS AND ENGINEERS MONTHLY* on Cures for Accidents at Road Intersections (page 29) reminded me of a similar condition we had in Erie County west of Sandusky on U. S. Route 6, in the village of Venice. Before the raised island was constructed, much confusion existed at this intersection, due to the entire area being paved. The raised island has controlled the traffic perfectly. No attempt is ever made to drive over the island.

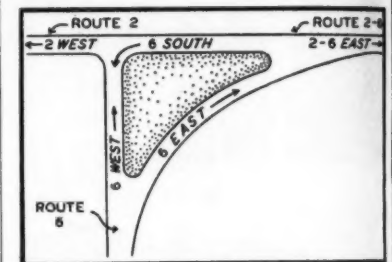


Diagram of island intersection of two major state routes in the village of Venice, Ohio.

Earth was placed directly over the pavement, the maximum depth being 30 inches, and seeded to Kentucky bluegrass, red top, perennial rye, and white Dutch clover. The beauty of the island could be greatly enhanced by the use of prostrate-type shrubs or ground covers such as *Euonymus coloratus*, *Pfitzer juniper*, or *Cotoneaster apiculata*, planted on the slope of the fill in a large arrangement at each corner.

After reading your article, I thought you would be interested to know that we are using raised islands to channelize and decrease traffic conflicts.

Very truly yours,
Chas. S. Ross,

Division Landscape Architect,
Ohio Department of Highways



British Combine Photo
Sir William Bailey, (right) inventor of the Bailey Bridge, takes a look at one of the bridges erected across the River Rhine in Germany to serve as a permanent crossing for use by supply trucks and other transport needed in the rehabilitation of Germany.

REPROCESSING OIL MATS

SAND-CLAY STABILIZATION

THORNTON CONSTRUCTION Co.
GENERAL CONTRACTORS
1025 ETHEL AVENUE
HAWCOCK, MICH.
January 3, 1945

Seaman Motors
305 N. 25th Street
Milwaukee 3, Wisconsin

Attention: J. D. Aldrich

Gentlemen:

For your information, the Seaman Pulvi Mixer we bought and the A-C-T Associates are using on the LaGrange Wisconsin C.A.A. Airport, is very satisfactory.

As you will recall, we rented a Pulvi Mixer for stabilizing sand and clay sub-base for the Camp Williams Airport in 1942. It did such a good job of mixing that we bought this year a Model MHD 72 pulverizer. This is doing an exceptional job of mixing and our success in meeting C.A.A. specifications for compaction is due in large measure to the mixing action of Pulvi Mixer.

From our experience to date, we feel that the machine is sturdy as our repair parts to date are very small considering its use.

Yours truly,

THORNTON CONSTRUCTION COMPANY
By *P. M. Thornton*
P. M. Thornton

PMT:t

STATE OF OKLAHOMA
STATE HIGHWAY COMMISSION
OKLAHOMA CITY
Muskogee, Oklahoma
January 24, 1945

Mr. J. D. Jenkins
1708 NW Sixth
Oklahoma City, Oklahoma

Dear Mr. Townsend:

In answer to your letter of January 19, relative to the operation of our Seaman Pulvi-Mixer, we have the following remarks:

We found this machine to be a great help in the reprocessing of our oil mats in our last year's program. We found that we could do a better mixing job, use less asphalt and save the services of two motor patrols in our reprocessing work. We also found that this machine speeded our work materially. We also will pay for itself in one oiling season in the saving in cost of reprocessing.

We have not tried this machine on stabilization work yet, but believe it will be very satisfactory with the reprocessing work.

Very truly yours,

J. D. Jenkins
J. D. Jenkins,
Div. Engineer

THE SEAMAN MIXER

These 2 letters prove SEAMAN Production and Performance

Mr. J. D. Jenkins, Division Engineer, Oklahoma State Highway Commission says in the letter shown above describing the work of the SEAMAN MIXER in reprocessing oil mats: "We found that we could do a better mixing job, use less asphalt and save the services of two motor patrols . . . We believe it will pay for itself in one oiling season" . . . Thank you, Mr. Jenkins. Your letter tells the story better than words of ours . . . And by way of proof of the remarkable efficiency of the SEAMAN

MIXER in soil stabilization, read the words of Mr. P. M. Thornton of the Thornton Construction Company, Hancock, Michigan . . . "We rented a Pulvi-Mixer for stabilizing sand and clay sub-base . . . It did such a good job of mixing that we bought this year a Model MHD-72. This is doing an exceptional job and our success in meeting C.A.A. specifications for compaction is due in large measure to the mixing action of the Pulvi-Mixer" . . . And thank you, Mr. Thornton. We hope these two letters prove a point or two.

SOIL
STABILIZATION
METHODS

Packed with practical information, SOIL STABILIZATION METHODS will be sent on request. Just ask for Bulletin E-24.

SEAMAN MOTORS
MILWAUKEE 3, WISCONSIN

C-110

River Channel Dredged For Stretch of 11 Miles

New 9 x 100-Foot Channel Improves Flood Control, Navigation and Irrigation Along Vermilion River

By WILLIAM H. QUIRK,
Eastern Field Editor

♦ A PROJECT calling for the excavation of 2,350,000 cubic yards to provide more effective flood control, and improved navigation and irrigation was recently completed on a section of the Vermilion River in southern Louisiana. The McWilliams Dredging Co., New Orleans, La., under a contract with the New Orleans District, U. S. Engineer Department, assigned a clamshell dredge, the Illinois, and a hydraulic dredge, the Vicksburg, to dig the 9 x 100-foot channel for an 11-mile stretch between Abbeville and Milton.

Prior to these dredging operations, the channel had an average central depth of less than 10 feet and an average width of about 50 feet at low water, while the many sharp bends in the river made navigation tortuous. During the dry season the level of the water dropped considerably just when it was greatly needed by the rice plantations in the flat lands through which the river flows.

In widening and deepening the channel, navigation was further improved by making the cuts, wherever possible, on the inside of the curves, thereby straightening the river to a considerable degree. The enlarged cross section of the channel will lessen the danger of the river overflowing in the flood season, while future similar improvements, north of this contract, will extend the flood-control benefits to an area as far north as Alexandria, La. This is possible because of the Ruth Canal, dug in 1920 by local interests, which connects the Vermilion River with Bayou Teche south of Breau Bridge, or about 18 miles north of the upper end of the recent improvement. With the enlarged river channel and the subsequent increase in the amount of water available, the rice plantations in this area will be



C. & E. M. Photo
On the Vermilion River contract, the pontoon line of the Vicksburg was 850 feet long.

provided with more adequate irrigation with water taken from the river by power-driven pumps.

Long-Range Program

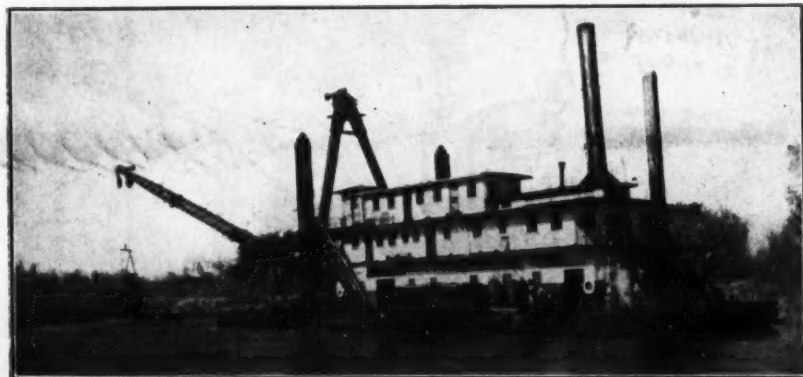
Obviously, widening and deepening 11 miles of river channel will not immediately answer all the problems of navigation, flood control, and irrigation in the Vermilion River basin. This contract, however, was but a part of a long-range program for the improvement of this river and adjacent waterways. Last year, just above the mouth

Clamshell and Hydraulic Dredges Used to Remove 2,350,000 Cubic Yards by McWilliams Dredging Co.

♦ THE contractor for the improvement of an 11-mile stretch of the Vermilion River in southern Louisiana north of Abbeville by dredging 2,350,000 cubic yards of silty clay mixed with some sand used a clamshell dredge to construct earth dikes along the bank, and a hydraulic dredge to pump the remainder of the material to be excavated from the river to the spoil area behind these dikes. The McWilliams Dredging Co. of New Orleans began the dike construction with its own dredge, the Louisiana, but when this craft was taken over by the U. S. Navy, a subcontract was given to the Lionel Grizzaffi Towing & Dredging Co. of Morgan City and New Orleans to complete the work with the clamshell dredge Illinois. All the hydraulic dredging was done by the Vicksburg, the property of the McWilliams Dredging Co.

The Illinois

The clamshell dredge Illinois was built in 1926 and was owned by the McWilliams Dredging Co. until April,



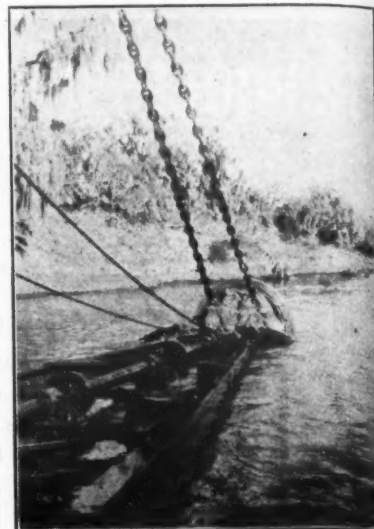
C. & E. M. Photo
The clamshell dredge Illinois, with a 135-foot boom and 3½-yard bucket, preceded the Vicksburg, building the spoil banks along the river behind which the material dredged by the Vicksburg was placed.

of the river, where the Intracoastal Waterway intersects the Vermilion, a 4-mile 8 x 80-foot channel, involving the movement of 917,000 cubic yards of material, was dug to the 8-foot-depth contour in Vermilion Bay and the Gulf. This contract was completed by the McWilliams Dredging Co. as was also the elimination of three large bends in the river north of the canal. Excavation for these cut-offs totaled 208,000 cubic yards.

The Federal government with its own equipment, a Bucyrus-Erie 180 dragline mounted on a barge, and hired labor forces next completed a 17-mile section totaling 1,110,000 cubic yards of dredging, and brought the 9 x 100-foot channel to the point of the recent contract north of Abbeville. This contract for 2,350,000 cubic yards extended a mile above Milton and is being followed by another contract which started in March, 1945, for the continuation of the 9 x 100-foot channel north to Lafayette with the dredging of an additional 4,240,000 yards.

Above Lafayette the Vermilion River will be dredged to a 6 x 60-foot channel which will carry the water from the Ruth Canal and from Bayou Teche. In order to improve navigation in the upper reaches of Bayou Teche and also to divert more water into the Ruth Canal and eventually into the Vermilion, the crest of the Keystone Dam built in 1913 on the Teche below St.

(Continued on page 32)



C. & E. M. Photo
The Vicksburg has a 5-blade 6-foot-diameter basket-type cutter head which encircles the 22-inch suction line.

capacity of 100 barrels. The vertical-type boiler is located within the deck housing near the stern of the dredge.

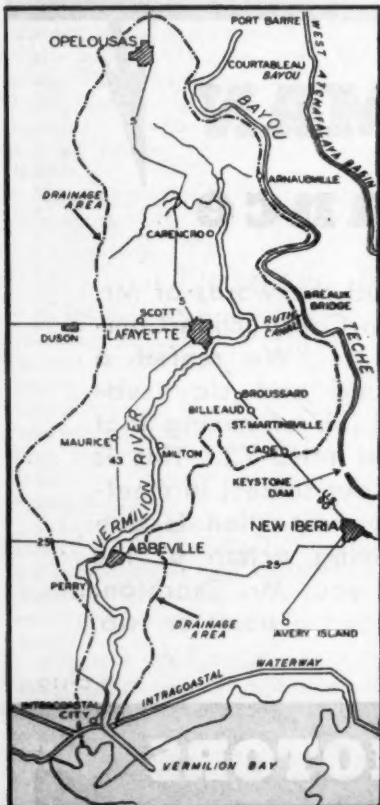
The principal features of any clamshell dredge are, of course, the bucket and boom which are the working tools. The Illinois has a 135-foot steel boom of the gravity swing type which operates in an arc of 180 degrees at the bow of the dredge. Most of the digging on the Vermilion River was done by a 3½-yard Williams heavy-duty bucket, but the dredge is also equipped with another clamshell, a 4½-yard Williams marsh-type bucket.

Located in the deck housing near the bow of the dredge are five separate Emerson-Brantingham steam winches. The winch in dead center on the deck operates the tagline or cable to control the bucket and move the dredge. On each side of this center winch is another which raises or lowers the forward port and starboard spuds respectively. To the rear of these three winches are the two main winches which load and hoist the bucket. The hoisting cables run from the end of the boom to sheaves on the A-frame which supports the boom, then down to other sheaves in the center of the dredge, and finally in to the hoisting winches.

Moving the Dredge

After making a cut 10 feet ahead across the width of the channel, the dredge moved forward for further digging. The bucket was placed on the bank ahead of the dredge, then the two steel forward spuds, 48 feet long x 24 inches square, which anchored the dredge during the digging operations, were raised. The wooden stern spud, 62 feet long with an 18 x 24-inch section, located in a 7-foot slot cut into the center of the hull at the stern, was raised by a winch located near the main boiler. The slot permits the spud to pivot freely at a point 15 feet above the deck so as to trail when the dredge is moving. The anchored bucket enables the dredge to

(Continued on page 89)



The drainage area of the Vermilion River in Louisiana.



C. & E. M. Photo
The McWilliams Dredging Co. used the hydraulic dredge Vicksburg in its contract for excavating 2,350,000 cubic yards from the Vermilion River in Louisiana, to improve navigation, flood control, and irrigation.

Portraits in Print

By BILL QUIRK

Wilbur F. Creighton of Tennessee, Stone Cutter, Civil Engineer, Builder

STONE cutter by trade, civil engineer by profession, builder through heredity is the way Wilbur F. Creighton, Nashville, Tenn., contractor, succinctly describes himself. The Creighton line of builders goes back to his grandfather, A. D. Creighton, who around 1850 was building some of the beautiful "ante-bellum" homes which are still standing today, one of the great contributions of the South to Americana. His father, R. T. Creighton, was City Engineer of Nashville before he and Major W. F. Foster organized a partnership in 1885 known as the Foster & Creighton Co. The two founders of this engineering and contracting firm have died, but today the name of this well known concern is still the same. Foster & Creighton Co., General Contractors, of which Wilbur F. Creighton is President, is now 62 years old and has an enviable record in the construction industry, having built railroads, locks, tunnels, roads, bridges, viaducts, dams, war training camps, and buildings of all types in Tennessee, Kentucky, Florida, Georgia, Alabama, Mississippi, and Arkansas.

Hanging on the wall in the private office of Wilbur F. Creighton are two pictures of the founders of the company. "Major Foster was something of a legend when I came to work for the company back in 1905," explained Creighton. "He was a northerner, a native of Springfield, Mass., whose father was one of the earliest railroad engineers in New England. The son came to Tennessee to build bridges, and when the War for Southern Independence began he enlisted as a private in the First Tennessee Regiment. He rose through the ranks, becoming a major, and served four years in the Confederate Army as an engineer officer. His military construction included the fortification of Forts Donaldson and Henry which yielded to the Federals only after a prolonged struggle.

"Came 1865 and the surrender of the C. S. A. army so the Major opened a private business as a surveyor in Nashville," continued Creighton. "My father went to work for him as an apprentice and carried on his business while the Major served a term as the first City Engineer of Nashville. After several years in this post, the Major got into a dispute with some politicians and quit, so Father took his place in the city administration. Father held this post for a year and a half, when he and the Major decided to form a partnership to do both engineering and construction work."

At first, with limited capital, operations of Foster & Creighton were confined to small contracts in the city, consisting of street work, sewers, curb and gutters, and residence foundations, but as the demand for railroads increased, operations were extended to constructing stone substructures for railroad bridges and branch lines. In 1888, the company did the engineering as well as the construction work on the branch railway line to Mammoth Cave, Ky.

Two of the largest contracts completed by the partnership in this early period were the grading and foundations for the Tennessee State Penitentiary, and the substructure work in connection with the Noel Mill at Estill Springs, Tenn., about 1889. This work consisted of a large quantity of earth excavation, an extensive rock cut for a tailrace, and a dam across Elk River. This was the first job on which the company used steam rock drills. A build-

ing-stone quarry was opened at New-som Station, Tenn., from which was quarried stone for foundation operations.

Probably the most difficult contract undertaken at this time, in 1893, was quarrying and cutting stone for Lock No. 3 on the Cumberland River. In 1898, the company received a contract for grading, stone retaining walls, and production of ballast for the L. & N. Terminal Yards in Nashville. On this job the company purchased its first one-cylinder gasoline engine to operate the rock crusher.

In 1905, the staff of the company was

increased by employing C. C. Foster, a son-in-law of Major Foster, to assist in the office work, and W. F. Creighton, the present president, to assist with the supervision of construction. But W. F. Creighton was no newcomer to construction even in 1905. As a lad of six he began spending his summers on construction jobs with his father, sleeping in rough bunks, learning how to shift for himself and get along with others.

"I still remember those hand-made bunks," reminisced Creighton, puffing intently on a pipe. "For a mattress we used ticks filled with straw with no cover except a blanket. The only effort at hygiene was the cook's weekly sweeping the chinchies, a tough specie of bedbug, out of the corners of the bunks with a whisk broom into a pan of scalding water."

The Stone Cutter

Wilbur Creighton looks more like a college professor than a construction man. At 62 he is slender, weighing about 130 pounds, 5 feet 10 inches tall,



Wilbur F. Creighton, President of Foster & Creighton Co., Nashville, Tenn.

and slightly stooped. He has a long, narrow, scholarly face, humorous blue eyes, wears glasses, and combs his gray hair straight back. He is witty, a ready

(Continued on next page)

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Wilbur F. Creighton, Engineer and Builder

(Continued from preceding page)

conversationalist on any subject, and smiles freely and often. His movements are quick, and though his physique is slight he is wiry and lithe.

He learned the trade of stone cutter as a boy in an old hand-operated quarry when his father's company was building locks on the Cumberland River. "It was all hard work in those days," reflected Creighton. "We used a 'plug and feather drill' and the stones were hoisted from the quarry on a winch operated by a mule which walked 'round and 'round in a circle. That is the same way the Egyptians pumped water from the Nile, only instead of a mule they used a bull as a 'hay burner'. To toughen my hands for handling the rough stone, I used to carry dry corn-cobs around, even taking them into my bunk and squeezing them before going to sleep."

Creighton's early life was a study in sharp contrasts. For nine months during the school term he attended classes dutifully and, under feminine influence, took dancing lessons from a negro dancing master, was taught the violin by a German professor, and was reared as a young southern gentleman. During the three vacation months, he read Diamond Dick and other lurid literature of that period, and associated with the rough-and-ready stone cutters, living with them at the quarry camp.

"At night all I heard was their loud boasts of feminine conquests," Creighton recalled, "the amount of liquor each could consume, and fights they had won. Few of them had families, or if they did they considered it a disgraceful association. Father used to say that the first stone cutters pulled a strike when they were working on King Solomon's temple and ever since then they have been cursed and cannot lead a happy family life."

"However, they saved my life one day when I was swimming in the Big Harpeth River and got carried away by the swift current. I was only twelve then and when I finally got thrown up on the shore, more dead than alive, they brought me to with the old-fashioned rolling-over-the-barrel method of resuscitation. My thoughts while drowning were that I would never become a stone-cutter foreman, then the prime ambition of my life."

The Civil Engineer

Saved by the barrel, Wilbur Creighton mastered the trade of stone cutter, and took his civil engineering degree at Vanderbilt University at Nashville in 1904. His first job after graduation was Division Engineer on the N. C. & St. L. Railroad between Memphis and Paducah, Ky.

"The pay was not very high then,"

mused Creighton. "Engineers got from \$30 to \$75 a month, but Paducah was a gay town and we had some wild experiences. I recall the time when a boy from Kentucky and I staged a drinking bout with some Michigan engineers. We had been trained well in how to hold liquor in our college days and after visiting every saloon in town the lads from Michigan were under the table. Somewhere along the line a fight developed between us and a gang of town toughs. My Kentucky friend and I escaped a beating by running through a house in Paducah's red-light district, jumping through a rear window into an alley, while the madame was holding our pursuers at bay with a pick handle."

Despite hard work and equally hard play, young Creighton within three years of his graduation designed and built a bridge about which he wrote a thesis and received his master's degree in civil engineering. In 1905 he married, and entered the firm of Foster & Creighton which shortly after was incorporated with a capital stock of 1,000

shares at a par value of \$100 per share.

Thereafter the growth of the firm was rapid, and a steady expansion in type and size of engineering contracts followed. Believing that it was unwise to confine its activities to engineering construction alone, the company began about thirty years ago to take contracts for buildings. Of the many buildings erected by the company, Wilbur Creighton takes the greatest pride in the five on the Vanderbilt University campus which have been constructed either wholly or in part by the Foster & Creighton Co.

The Builder

"I do not care especially about constructing commercial buildings," said Creighton. "They last so many years, become outmoded, then are torn down, replaced and forgotten. College buildings on the other hand will last a few lifetimes and grow more beautiful with age."

"While on the subject of schools," continued Creighton, "I should like to

see a change in the engineering curriculum. The present system of engineering education narrows instead of broadens the individual, and turns out a humdrum sort of person. I am thinking of an engineer friend of mine who confesses that the only reading he has ever done is in technical books or magazines. He finds it impossible to derive pleasure from reading other types of non-fiction or even a current novel. To him two and two are always four and that's that. I feel that an engineer should get two years of academic training, the same as a doctor, study a little Latin and Greek, and become an educated man before starting his engineering studies."

"With a broader outlook, the engineer would learn to sell his services better, for he is underpaid more than any other professional man. The engineer has to take pleasure in what he is doing, for his services are seldom paid what they are worth."

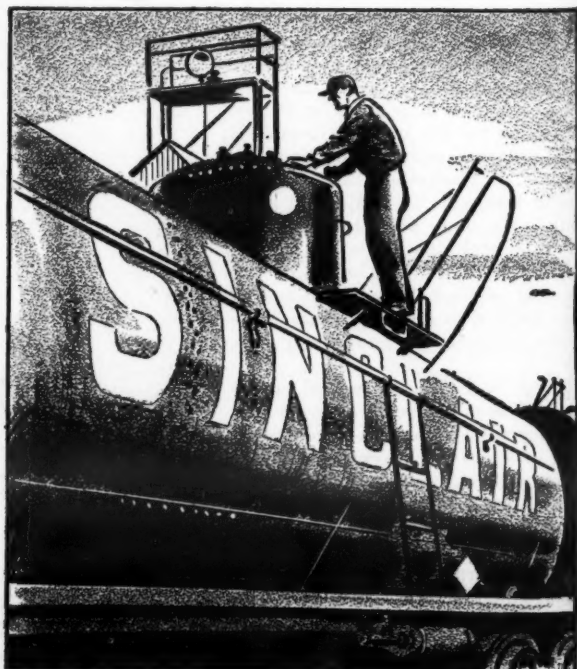
"That is true also in the case of the
(Continued on page 52)



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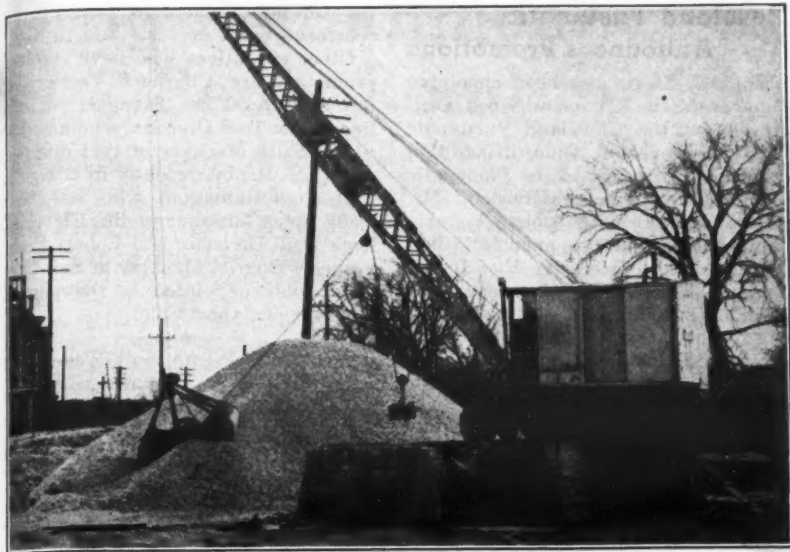
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In order to solve the problem of limited space in its storage yard, the Small Construction Co. of Topeka, Kans., set its Byers Master crawler crane on twin concrete piers 6 feet high, thus making possible higher stockpiles of aggregate. Preformed wire rope is used on the crane for longer service life.

Boosting the Crane Boosted Production

There were several disadvantages to operating a crane from ground level when stockpiling materials at the yard dock of the Small Construction Co. in Topeka, Kans., the main one being the lack of sufficient ground storage space and the need to have a higher pile. They tried to correct this by lengthening the boom 6 feet by welding and riveting in a new middle section. This threw the crane out of balance and also reduced the safe bucket capacity to $\frac{3}{4}$ yard.

The problem was finally solved by the construction of twin concrete piers supporting a base 6 feet from ground level. The piers were built wide enough for the crane treads and with sufficient room on each side to walk around the machine. The crane was run onto the pier and a cable fastened to the front and back axle was crossed and anchored to the pier by reinforced sockets. The section which had been placed in the boom was then removed.

By thus boosting the crane an increase of fully 6 feet was gained in the stockpile. Further, the equipment is now always level and can withstand any reasonable shock or bite. The machine handles much better and it is no harder to service.

George Holmes, crane and dragline operator for Small Construction Co., who reported this idea to us, says that all the company's cranes, draglines and shovels are equipped with $\frac{3}{4}$ and $\frac{5}{8}$ -inch preformed wire rope. They find that with reasonable maintenance they get twice the service life from this type of rope. The ropes are cleaned, inspected, and treated with a Visolite lubricant at regular intervals. This service is reported to the bookkeeping department. Findings from inspections are handed in on cards which go to the maintenance department. If a new cable is installed, or a rope cut back or ends switched, a report is made. All rope service and maintenance are handled by the machine operators except on ropes which go to the repair shop for storage. In this case the rope is thor-

oughly cleaned and treated with a heated bath dressing before being stored. It is believed that this rope care, both on the job and at the shop, adds 50 per cent to the cable life.

Veterans Will Provide New Construction Workers

At least 600,000 men now in the armed forces have had military training or civilian experience in phases of construction work, according to Senator James E. Murray of Montana, Chairman of the Senate Small Business Committee which has been holding hearings to explore the opportunities for veterans in construction and the timing of construction to meet employment needs.

In normal times, construction is one of the country's largest industries, and employment for millions of returning veterans and discharged war workers can be provided in the construction industry, if restrictions are removed as quickly as improvement in the war situation permits.

Steel Sheet Piling Used In Erosion, Flood Control

Because of the increased interest in soil conservation, reclamation, and erosion and flood control, the Caine Steel Co., 1820 No. Central Ave., Chicago 39, Ill., has recently issued a brochure on the use of corrugated steel sheet piling in soil-erosion and flood-control work, and in the construction of gully check dams, sea and dock walls, and flood protection walls.

The 8-page booklet contains not only a description of the types of Caine corrugated steel sheet piling but also discusses its use for a variety of erosion and flood-control purposes. Illustrations show actual projects, and drawings provide suggested designs for use of piling in such service.

Engineers and contractors interested in information on the use of steel sheet piling in projects of this type may secure copies of this brochure by directing their requests to the manufacturer and mentioning this review.

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Heavy-Duty Motor Oil Subject of New Bulletin

A 43-page bulletin discussing the composition, operating characteristics, and test performances of Stanolube HD, a lubricant for heavy-duty gasoline and high-speed diesel engines, has been issued by the Standard Oil Co. of Indiana. After a brief foreword and introduction, the book proper begins with a history of heavy-duty detergent-type motor oils since their development in 1936, followed by a discussion of the tests and requirements of this type of lubricant and an evaluation

of Stanolube HD as a lubricant meeting U. S. Army and Navy specifications. Recommended applications and service information are treated at some length, and a complete lubrication table and viscosity guide are given at the back of the book. Excerpts from U. S. Army Specification No. 2-104B are also included.

Copies of this well illustrated and informative Technical Bulletin No. 45-1 are available to readers who write on their official stationery to Standard Oil Co. of Indiana, 910 So. Michigan Ave., Chicago 80, Ill., and mention this publication.

Cleveland Pneumatic Announces Promotions

Elmer J. Steger has been appointed Manager of the Cleveland Rock Drill Division of the Cleveland Pneumatic Tool Co., Cleveland, Ohio, in addition to acting as Manager of the Pneumatic Tool and Appliances Division. Mr. Steger, who recently completed his twentieth year in the pneumatic-tool industry, is also Executive Vice President and Treasurer of the company's Canadian subsidiary, Cleveland Pneumatic Tool Co. of Canada, Ltd. Prior to his present connection, he was with

the Chicago Pneumatic Tool Co. for fourteen years.

Other executives who have received promotions are: Charles E. Vanderpool, formerly Assistant Manager of the Pneumatic Tool Division, who now becomes Sales Manager of that division; Albert H. Hruby, recently in charge of contract termination, who has been made Sales Manager of the Cleveland Rock Drill Division; and Robert Craig, formerly District Manager at Salt Lake City, Utah, appointed to the post of Manager of Export Sales.

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23 out of the 24 track-type tractors used were "Caterpillar" Diesels.

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The 7 motor graders used were "Caterpillar" Diesels.



*D. W. Winkelman Co., Inc., contractor. Illustration shows only a small portion of equipment used on project.

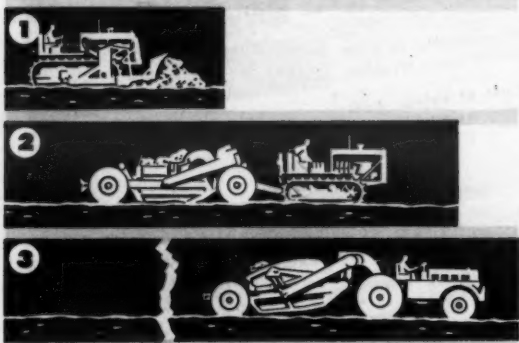
Wagons, bulldozers, rollers, scarifiers, distributors, mixers and minor pieces completed the well-rounded equipment for handling this and similar large-scale projects with efficiency—and with minimum risk of underestimates or delays.

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Drag Retreatment Seals Road Surface

Bituminous Highway Is Improved by State Crew As Part of the 1,500-Mile Program for 1945

WHEN the first of April rolled around, signifying the opening of the bituminous season in North Carolina, state highway maintenance forces took to the roads, beginning their operations on an 8-mile stretch of secondary highway between Holly Springs and Apex on State Route 55 in Wake County, about 15 miles southwest of Raleigh, capital of the Tarheel State.

Known as a drag retreatment, because of the prominent part a drag broom plays in the operations, this type of bituminous resurfacing will have been applied to about 1,500 miles of similar roads by the time the bituminous season closes at the end of September. The State has about 6,000 miles of secondary roads surfaced with a light bituminous treatment, and it is necessary to resurface such roads at an average of 4-year intervals in order to maintain them in satisfactory condition.

The road running north from Holly Springs was built by contract in 1939 with a 7-inch stabilized-soil base, 20 feet wide, which was then given a prime coat of RT-2 tar at the rate of 0.3 gallon to the square yard. After the prime had thoroughly dried, a mat was applied, using 150 to 200-penetration asphalt at the rate of 0.4 gallon to the square yard, and covered with stone aggregate ranging in size from 1 1/4 inches down to 1/2 inch, most of which was between 3/4 to 1 inch, spread 45 pounds to the square yard. The tar prime penetrated the base course, which was taken from local borrow pits and generally used in its natural state or strengthened with an addition of gravel, to a depth of 1/8 to 3/8 inch, bonding the base surface. After rolling the mat stone, the road was opened to traffic a couple of weeks, and then given a seal similar to the drag retreatment which is now being described. The total thickness of the double surface treatment is about 1 inch.

The Retreatment

As the first step in the drag-retreatment operation, the 6-year-old road was thoroughly cleaned of foreign material and dust for its full 20-foot width by a Hough rotary power broom pulled by a truck. A tack coat of RC-2 cut-back asphalt was then applied at the rate of from 0.15 to 0.17 gallon to the square yard by an Etnyre 1,000-gallon distributor mounted as a semi-trailer on a Chevrolet truck. Traffic was maintained by working on only half the road at a time and using a 10-foot spray bar on the distributor.

Asphalt was purchased from the Ashland Oil & Refining Co. at Ashland, Ky., on the Ohio River near the border of West Virginia and Ohio, and transported by rail about 350 miles to a siding of the Durham & Southern RR near Holly Springs at the south end of the job. A 30-hp locomotive-type horizontal coal-burning boiler was hauled to the siding to heat the 10,000-gallon tank cars by circulating live steam through its coils of pipe. The asphalt was heated to around 135 degrees F and then unloaded into a 1,000-gallon transfer tank truck by a 3-inch Deming asphalt pump powered by an International 4-cylinder 22-hp engine, the entire unit being mounted on a 2-wheel trailer. The transfer truck was loaded in 15 minutes and then driven to where the distributor was working. As the maximum length of haul on this job was only 8 miles, the pump on the dis-

tributor transferred the asphalt to its own tank and applied it on the road while the bitumen temperature was still around 125 degrees F, without need of further heating. Two of these 1,000-gallon transfer tank trucks were sufficient to keep the distributor supplied with asphalt.

Stone Cover Coat

Immediately after the application of the tack coat, the asphalt was covered with a layer of crushed granite, known as No. 9 aggregate, which conformed to the following grading requirements:

Standard Square-Opening Sieves	Per Cent of Total by Weight Passing
3/4-inch	100
3/8-inch	85-100
No. 4	20-35
No. 16	0-4
No. 200	0-0.5



This drag broom, used in coating road aggregate with asphalt, has given the name "drag retreatment" to a North Carolina bituminous resurfacing operation.

This stone was purchased from the Greystone Quarry at Henderson, N. C., about 60 miles northeast of Holly

Springs, and transported by rail in hopper-bottom cars to the siding at the
(Continued on next page)

A plain statement of LA PLANT-CHOATE'S Sales Policy

For over 22 years, thousands of successful operators in all parts of the world have been accustomed to buying LaPlant-Choate equipment for use exclusively with "Caterpillar" tractors. As a result of this arrangement and LaPlant-Choate's leadership in pioneering new developments, this company has now become one of the world's largest manufacturers of tractor equipment.

Since 1941 alone, LPC has delivered over 30,000 earthmoving machines of all types (spare parts excepted)—including almost half of all the hydraulic and cable operated dozers produced by the entire industry for military and civilian use.

While there have been all sorts of confusing rumors, it can now be announced that job-proved LaPlant-Choate scrapers, hydraulic dozers, rippers and land clearing tools will continue to be available with "Caterpillar" tractors for many months to come. In addition, as soon as conditions permit, LPC will offer a complete new line of improved cable dozers, scrapers and hydraulic power units for use with certain other track-type and high speed rubber tired tractors.

LaPlant-Choate has always believed that the job of designing and building dependable tractor equipment is a special business in itself, requiring "undivided interest" and years of specialized "know-how". Consequently, it is LPC's firm intention to go forward as an independent organization with one basic objective—to continue building the best tractor equipment on the market at the lowest possible cost to the user. Isn't that exactly what you want when you buy tractor equipment? LaPlant-Choate Manufacturing Co. Inc., Cedar Rapids, Iowa, San Leandro, California.

SIX REASONS WHY LPC IS YOUR BEST BET...

JOB-PROVED PERFORMANCE

ENTIRE ORGANIZATION STRICTLY
"TRACTOR-EQUIPMENT-MINDED"

WORLD-WIDE USER ACCEPTANCE

LATEST MODERN PRODUCTION FACILITIES

34 YEARS OF ENGINEERING AND
MANUFACTURING "KNOW-HOW"

STRONG FINANCIAL POSITION

LAPLANT

EARTHMOVING AND LAND



CHOATE

CLEARING EQUIPMENT



Drag Retreatment Seals Road Surface

(Continued from preceding page)

job site. The siding is located on a slight fill so at one point beneath the ties a hole was dug large enough for the end of a Haiss belt loader to slip under. Flap boards were installed along each side of the hopper extending down to the rail in order to have the aggregate feed to the belt gradually, and not spill all over the ground with a possible choking of the belt. This 24-inch-wide x 24-foot-long belt loader filled a 1½-ton truck in 1½ minutes.

Ten 1½-ton dump trucks, Fords and Chevrolets, were used in unloading the aggregate cars and hauling the stone about ¼ mile to an open field alongside the road where a stockpile containing about 2,000 tons was stored before work on the road started. In normal times it is not considered economical to unload the aggregate into stockpiles before beginning retreatment work unless the haul from the delivery point to the site of the work is at least 10 miles or more. However, due to the critical shortage of railroad cars for aggregate and for bituminous-material shipments, North Carolina decided to go to this extra expense of stockpiling the aggregate instead of hauling directly from the cars to the job, in order to release the cars more promptly.

The same Haiss loader was then moved to the stockpile where it was put to work loading the same trucks which had been fitted out with Gibbes spreader boxes, 7½ feet long, at the rear of the truck bodies. The trucks backed over the tack coat, spreading the stone before their wheels came in contact with the asphalt, but the 7½-foot box actually spread a layer of stone about 8½ feet wide as the aggregate fell from the height of the truck body. The No. 9 aggregate was spread at the rate of 32 pounds to the square yard, leaving a strip of asphalt 1½ feet wide at the center of the road uncovered. This strip was later covered with aggregate by blocking off the spreaders to the required width.

When the aggregate was thoroughly dry, RC-2 asphalt was sprayed on at the rate of 0.23 to 0.25 gallon to the square yard and was immediately fol-

lowed by the drag broom. The function of this broom, which is the key point in the drag retreatment, is to coat the aggregate thoroughly with bitumen while the asphalt is still workable.

The Drag Broom

A 4-wheel-drive GMC 1½-ton truck stripped down to its chassis carries the drag broom. Over the rear axle of the truck a welded steel box has been fastened into which sand bags can be placed for increasing the weight on the truck frame and adding pressure to the broom. The frame for holding the brooms is 11 feet 4 inches long x 11 feet 2 inches wide, made of 4 x 4 x ¼-inch angles, and has three rows of brooms between the front and rear wheels and three rows behind the rear wheels. The frame, which extends outside the rear wheels, is pulled by a chain hooked over the front bumper of the truck. The broom frame can be raised and lowered by means of a ½-inch cable traveling over 6-inch sheaves fastened to the truck frame, the necessary power

being furnished by a 6-inch winch and a hydraulic pump. Three cable suspension points are located on each side of the truck, with the cable connected to the broom frame at each point by means of a ¾-inch round x 9-inch long steel bolt. Spacing of the 6-inch steel bristle brooms which extend the width of the frame is, from front to back, 2 feet 4 inches, 2 feet 6 inches, 4 feet 6 inches, and 2 feet 0 inches, the last two rows being placed against each other. The drag broom can be worked on the aggregate at any pressure by raising or lowering the frame, and can be lifted clear of the road when the truck is moved to another location or turned around.

When the aggregate was uniformly coated with asphalt after a couple of trips over the road with the drag broom, the surface was given another cover of No. 9 stone by the trucks and spreaders at the rate of 5 pounds to the square yard. This final cover prevents traffic from picking up the bituminous material and serves to key the entire surface,

which was then rolled by a Galion 5 to 8-ton tandem roller. The second half of the road was similarly treated.

Patching

In these resurface treatments, when a failure in the pavement is observed, the cracked or broken area is dug out by hand with picks and shovels, the hole is filled with selected base material, and a bituminous cold patch is applied so that a uniform surface is obtained before the drag retreatment begins. Sometimes on these bituminous roads a concave strip 2 or 3 feet wide develops along the edge of the pavement. This strip is given a light application of RC-2 asphalt by plugging all the nozzles on the spray bar of the distributor with the exception of two or three at the end. A light cover of the stone aggregate is then put on through the spreader box on the truck, which has been blocked off with sections of wood to the required width. A Galion 3-ton roller is used on these

(Concluded on next page, Col. 2)



FLIGHT-VEYOR

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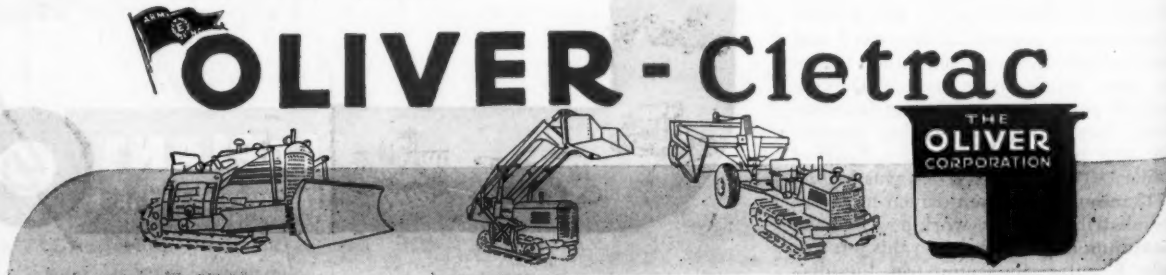
• When you're taking a heavy load downhill, you'll find that an Oliver "Cletrac" crawler tractor never gives you a "bum steer." To turn right, you pull on the right lever . . . to the left, pull on the left lever. Contrast this simple, easy steering with the ordinary tractors, where you have to "cross steer" in order to control the tractor under such conditions.

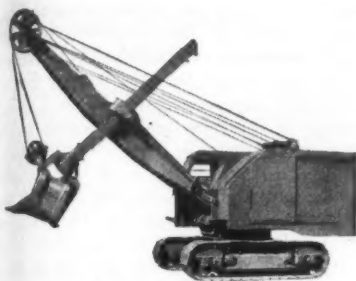
The smooth, positive control of Oliver "Cletrac" tractors is a result of their patented *controlled differential steering*. Power is never completely disconnected from either track even when turning. One track speeds up . . . the other slows down, assuring positive traction throughout the entire turn. The load cannot swing the tractor in the opposite direction. This exclusive steering assures greater safety on hills and slopes . . .

eliminates operator confusion on downhill trips.

Oliver "Cletrac" tractors are ruggedly designed for long, dependable service. Completely built in the modern, well-equipped Oliver "Cletrac" plant, these tractors have no dead weight to reduce load capacity and create unnecessary strain. Majority of parts are either drop-forged or rolled steel. Tractors are designed for unusual accessibility, making maintenance and adjustment easy.

Substantial numbers of Oliver "Cletrac" tractors are now being released for essential use. Your Oliver "Cletrac" dealer will gladly assist you in making application for a new tractor. **The OLIVER Corporation**, Industrial Division, 19300 Euclid Avenue, Cleveland, Ohio.





The new 605 1 1/2-yard shovel-crane-dragline is the latest addition to the Koehring excavator line.

New 1 1/2-Yard Shovel Joins Post-War Line

The second addition to its post-war line of excavating equipment has recently been announced by the Koehring Co., 3026 West Concordia Ave., Milwaukee 10, Wis. The new model, the 605 1 1/2-yard shovel-crane-dragline, joins the 205 1/2-yard excavator announced a short time ago.

Three basic features have been stressed in the design of the new Koehring 605: ease of operation, basic strength and simplicity, and quick convertibility. The main drum clutches are of a new improved design. Power-engaged but manually released, they enable the operator to retain the "feel" of the load at all times, and frequent adjustments are unnecessary, the manufacturer states. Independent power or live boom control or a combination of both is available. The shovel dipper trip is the trigger-fast pawl-and-ratchet type exclusive on all Koehring excavators. Crowd-retract and swing-traction clutch levers work easily because of a new double-fulcrum linkage which eliminates partial engagement of the unused clutch. The high A-frame on the 605 is raised or lowered by power. Hook rollers are easily adjusted.

The main shafting on the 605 is straight. Shoulders and keyways have been eliminated. Separate crawler frames give the lower assembly added flexibility. The shovel boom has an improved foot shock absorber. A simplified shipper shaft is designed to be removed easily. The dragline fairlead is pin-mounted for quicker conversion.

Further information on the new Koehring 605 1 1/2-yard excavator and its availability may be secured by those interested direct from the manufacturer by referring to this item.

Gravel-Pit and Quarry

Equipment Described

A new 16-page bulletin, No. 557, recently issued by Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn., describes and illustrates Pioneer jaw and roll crushers; apron, traveling grizzly, and reciprocating plate feeders; portable and permanent belt conveyors; scalping, vibrating, and revolving screens; and paddle-type and screw-type dehydrators for sand.

Copies of this bulletin may be secured by writing direct to the manufacturer and mentioning this review.

Drag Retreatment Seals Road Surface

(Continued from preceding page)

patch and strip operations. The roller is a portable unit, attached to a carriage with two pneumatic tires, so that the roller itself can be jacked up and pulled quickly around by a truck to any desired location.

Personnel

A force of about thirty is needed for a drag-retreatment operation and is used in the following capacities:

- 1 foreman
- 9 laborers to feed the conveyor belt at the stockpile in loading trucks
- 1 operator for belt conveyor
- 10 truck drivers
- 2 distributor men, driver and operator
- 1 fireman at the boiler heating the bituminous material
- 1 stone-spreader unloader
- 1 operator of drag broom
- 2 rakers to follow drag broom for additional smoothing if needed
- 2 roller operators

This crew averages a mile of full-width drag retreatment in a 10-hour

day. Because of the labor shortage in North Carolina, as well as practically everywhere else, convicts who are classed as "trusties" are employed in these maintenance crews and are used mostly as laborers shoveling the stone to the conveyor belt. Many have become sufficiently skilled to operate some of the equipment but a roller is the fastest moving piece of road machinery with which they are entrusted. Needless to say none of them operates a truck.

A useful piece of equipment, part of all these maintenance crews, is a trailer on which is built a 555-gallon tank for gasoline, and a compartment for storing oil and grease. This unit is towed by a truck and services all the road equipment.

Throughout the state there are ten similar crews doing this type of work, while before the war there was double that number. Because of this shortage of labor in the state maintenance personnel, the State Highway Commission planned to advertise for bids on this

drag retreatment and do some of this work in 1945 on a contract basis. Previously it had always been a maintenance-force operation.

Last year some difficulty was met in obtaining tank cars which were on the ration list, and since one 10,000-gallon tank car is needed for 2 miles of 20-foot surfacing, the State could obtain sufficient bitumen last year for the drag retreatment of only 1,387 miles of its secondary roads.

All bituminous road work is under the direction of T. V. Fahnestock, Bituminous Engineer, with W. Vance Baise, State Highway Engineer for the North Carolina State Highway and Public Works Commission. E. L. Green is Road-Oil Supervisor in charge of all retreatment work in the Fourth Division in which the Holly Springs to Apex drag-retreatment project is located.

Waste paper is still vital to victory. Be sure that all yours does its part in licking the Japs.

Why Construction Methods Demand ISAACSON KABLE TRAC-DOZERS

Speed necessitated by today's demands for increased production, is responsible for many new, improved methods of operation. Short cuts introduced in the construction field demand the help of fast, positive controlled dozers. They speed up work on cuts and fills. They roll big loads, uproot stumps and dig out boulders. They level, back-fill and grade as well as do lots of other time-saving jobs.

Isaacson Kable Trac-Dozers do all this because they give fast, positive control and smooth, powerful operation so necessary for all-out dozer performance.

Heart of successful cable operation is the versatile Isaacson Power Unit. It's simple, dependable and easy to adjust. For short cuts that mean speed and profits, use a Kable Trac-Dozer. See your dealer or write for full details.



ISAACSON

LANSING

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CONCRETE MIXERS
DRAG SCRAPERS

Lansing Company
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SINCE 1861



Acme and U. S. Army Signal Corps Photos

Left, GMC dump trucks serving the 13th AAF haul huge loads of crushed coral for runways on Guam. Right, driven 25,000 miles on short hauls, this GMC stops for regular servicing before further duty.

Trucks Do Big Job For AAF in Pacific

The completion of 1,000,000 truck-miles in 24 months of constant service overseas, without a major accident or a man-day lost due to any motor mishap, is the proud record of a 13th AAF Quartermaster Truck Company commanded by Captain Carl Reese, of Huntingburg, Ind. The trucks in this outfit, all GMC's, handle every type of job from carrying wounded men to hauling crushed rock for air-base construction. That this job has been so well done is not only a tribute to the outfit, but also a lesson in the importance of proper servicing of motor equipment to keep it functioning for victory. Comparable rugged service can be obtained from our trucks here at home, if they are properly maintained.

The early days, when the Allies fought a desperate war against overwhelming odds in the Solomons, were the hardest for Captain Reese's outfit. Home-made parts, developed to overcome the tight supply system, were frequently taken into foxholes with the men during enemy air raids, because they were too precious to leave exposed to falling bombs. Rain, glue-like mud, jagged coral particles, rot and rust haunted the dreams of the Truck Company commander. Brake drums, for example, were often found to be packed with silt when the big wheels were removed.

Now the 13th AAF has the Japs on the run in the Dutch East Indies, the Philippines, and Borneo, so supply problems are fewer. But as the "Fight-in' 13th" advanced across the Pacific from Guadalcanal, the Quartermaster Truck Company's GMC "six-by-sixes"

kept supplies moving to the airstrips well up on the fighting front.

In spite of difficulties seldom encountered in other theaters, this company did its job of "keeping 'em rolling" so well that it won an "excellent" rating in an overall inspection of service and equipment conducted by the 13th AAF

Inspector General's Office after the unit's second anniversary overseas.

The GMC Truck & Coach Division of General Motors Corp., Pontiac, Mich., which made the trucks used by this outfit, has built more than half a million "six-by-sixes", often referred to as "The Workhorse of the Army", for use by our military forces.

Subgrade Paper Aid In Concrete Paving

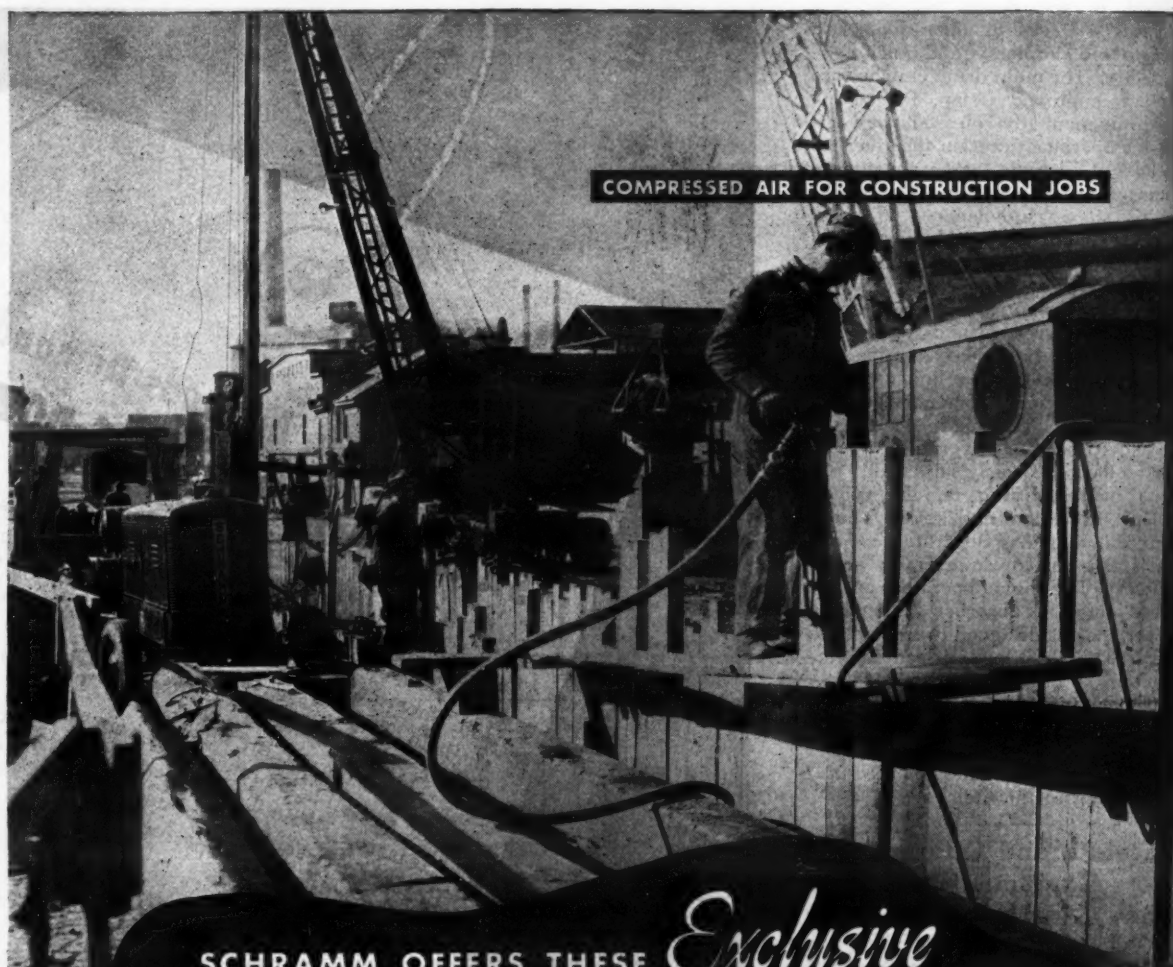
It is axiomatic that water is an important component of a concrete mix and must remain in suspension throughout the hardening stages. For this reason, various methods of concrete curing to prevent the evaporation of water from the mix are used on concrete paving jobs. However, there is another avenue of escape for water in the concrete mix and that is into a subgrade of sand, slag, or other pervious material.

To control this condition, there has

been extensive use of Scutan moisture-proof paper on the subgrade of roads and runways, to insulate the concrete from the base. In this usage, Scutan prevents seepage into the soil, holding water in the mix, and thus aids in the curing process. The manufacturer points out that more than 1,000,000 square feet of Scutan was used in the construction of concrete runways at Floyd Bennett Airport in New York City, and many miles of roads have been built with Scutan placed on the subgrade prior to pouring the slab.

Scutan is available in rolls up to 144 inches in width for this purpose, and a grade of Scutan is also available in rolls up to 12 feet for use in covering freshly poured concrete to aid the curing process.

Contractors and engineers interested in securing further details on the use of Scutan in concrete paving of roads and runways may do so by writing direct to Scutan Division, Union Bag & Paper Corp., Hudson Falls, N. Y., and mentioning this item.



SCHRAMM OFFERS THESE *Exclusive*
COMPRESSOR • ECONOMY FEATURES



This Stands for Honorable
Service for Our Country

Four features make Schramm Air Compressors ideal for construction jobs . . . (1) 100% water cooled (2) Compact—lightweight (3) Mechanical intake valve (4) Forced feed lubrication. These features enable you to do your compressed air job quickly—easily—economically!

Schramm Air Compressors are designed for heavy duty, continuous service, with minimum attention. They are built in sizes ranging from

20 to 420 cu. ft. of actual air, in every type of mounting and assembly. Lightweight, compact, sturdy, they are easily moved about on the job. Other Schramm features include long life discharge valve and complete push button electric starter. Make your construction jobs easier by using a Schramm Air Compressor to get air wherever needed. Write today for details contained in new, informative booklets just published,

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Heavy Duty
Machinery Trailers

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CAPACITIES

3 TO 200 TONS

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SCHRAMM INC. THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

New Chief Engineer Of Crane & Shovel Div.

The Insley Mfg. Corp., Indianapolis, Ind., has announced the appointment of Louis R. Russell as Chief Engineer of its Crane & Shovel Division, in charge of research, design and development of present and future models. His appointment will permit Frederick B. Ray, Chief Engineer of the Concrete Equipment Division and a specialist in that line during his 25 years with Insley, to devote all his time to research and development in the field of concrete equipment.

Mr. Russell has a background of 38

years of experience in shovel design engineering, having been associated with the Erie Shovel Co., Bucyrus-Erie Co., Koehring Co., and Marion Steam Shovel Co. During his long experience, he has designed and developed shovels and cranes from ½ to 12-cubic-yard capacities, powered by steam, gasoline, and diesel engines, and by electric power plants.

New Vibrator Catalog

A complete line of gas and electric concrete vibrators, together with concrete surfacing attachments and high-speed grinders, is described in a pro-

fusely illustrated 8-page catalog available from the Master Vibrator Co., 200 Davis Ave., Dayton 1, Ohio. Designed for a wide range of concreting operations on highway and bridge work, for reinforced-concrete buildings, tunnel lining, core walls and similar jobs, Master vibrators are available in a variety of heavy-duty all-purpose and medium-duty models from ½ to 4 hp, with vibration speeds from 3,600 to 7,200 rpm. A page of the catalog is devoted to high-speed grinding tools, and two pages illustrate and describe the Master line of generator plants, both gas and electric.

For copies of Bulletin No. 528, read-

ers of CONTRACTORS AND ENGINEERS MONTHLY should write direct to the manufacturer and mention this brief review.

New Dealer Quarters

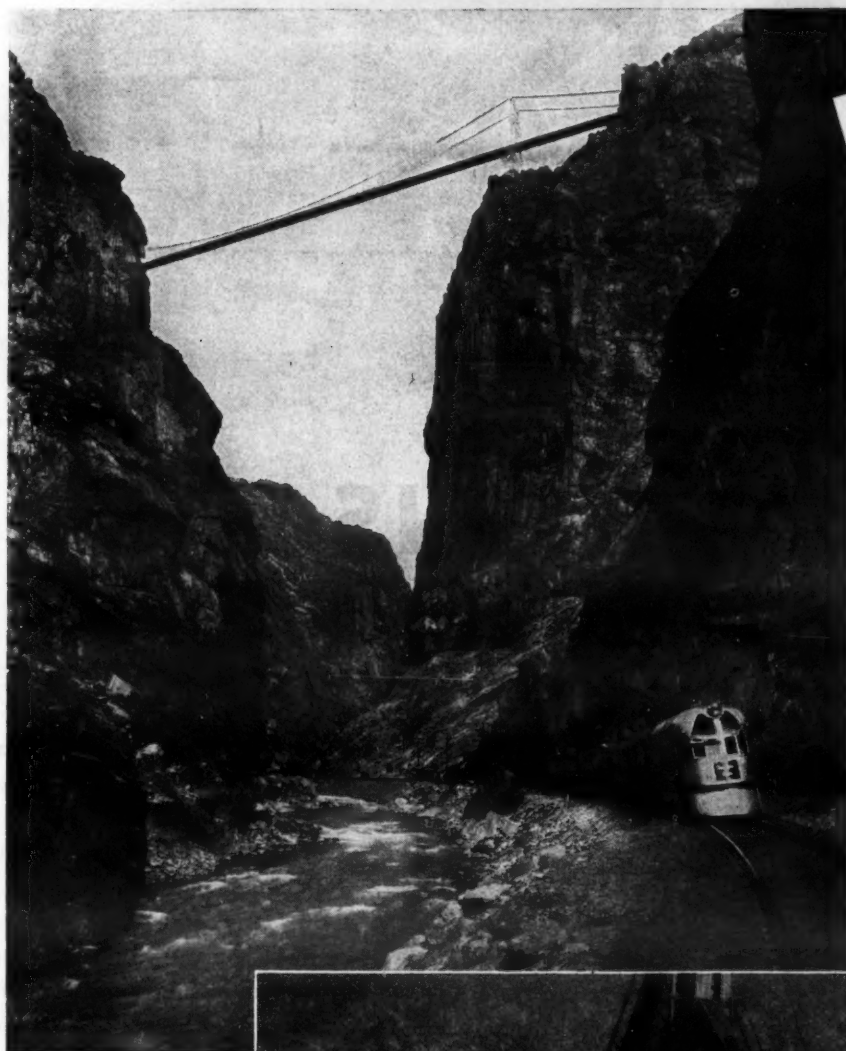
The W. T. Walsh Equipment Co., well known equipment distributor of Cleveland, Ohio, recently announced the opening of its new quarters at 12750 Berea Road to provide expanded service facilities for its customers. This company, which represents a long list of manufacturers of construction equipment, already has some new "post-war" models on display.

build better RAILROADS ... with Ballast from a Cedarapids Master Tandem

Rebuilding the roadbeds of the nation's railroads after the war years' forced neglect will require millions of tons of aggregate. Much of this work must be done in remote sections of the country so that it will be more advantageous to take the crushing plants to the jobs. That's why the portability and high capacity of Cedarapids Master Tandems are so important. With a Cedarapids Primary unit ahead of it, the Master Tandem reduces big rock to uniform ballast size in a

continuous flow, smoothly and economically. The entire plant is on wheels and can be moved easily from one job to the next without delay. Every part is designed and built to stand up under the hardest use with only a minimum of maintenance.

Whatever your requirements for aggregate producing or asphalt mixing equipment for tomorrow's construction jobs you'll find your best source of supply in Iowa's complete line. See your local dealer or write.



THE IOWA LINE

of Material Handling Equipment
Includes

- ROCK AND GRAVEL CRUSHERS
- BELT CONVEYORS—STEEL BINS
- BUCKET ELEVATORS
- VIBRATOR AND REVOLVING SCREENS
- STRAIGHT LINE ROCK AND GRAVEL PLANTS
- FEEDERS—TRAPS
- PORTABLE POWER CONVEYORS
- PORTABLE STONE PLANTS
- PORTABLE GRAVEL PLANTS
- REDUCTION CRUSHERS
- BATCH TYPE ASPHALT PLANTS
- TRAVELING (ROAD MIX) PLANTS
- DRAG SCRAPER TANKS
- WASHING PLANTS
- TRACTOR-CRUSHER PLANTS
- STEEL TRUCKS AND TRAILERS
- KUBIT IMPACT BREAKERS

IOWA

MANUFACTURING CO.

Cedar Rapids, Iowa



Grading and Base For New Runways

(Continued from page 1)

taxiways and 90 per cent under the adjacent graded areas extending outside the runways. A 4-inch compacted sub-base was placed under runways but was increased to 7 inches for 500 feet at each end and under all taxiways and apron. On the sub-base was constructed a 9-inch-thick compacted crushed-stone base, with a prime coat and a bituminous top 2 inches thick, increased to 2½ inches for 200 feet at the ends of all taxiways and runways. A light seal coat will finally be placed to cover all bituminous surfacing.

The contract for this project was awarded by the Fifth Regional Office, Civil Aeronautics Administration, to a group of contractors headed by the Concrete Materials & Construction Co. of Cedar Rapids, Iowa.

Storm Sewers

The storm sewers and subdrains were sublet to O. N. Gjellefeld of Forest City, Iowa, who used a 1½-yard Lorain dragline, a ¾-yard Koehring dragline, a ½-yard Insley dragline, and a Buckeye 120 trencher for excavating the ditches. The draglines also handled the heavier pipe.

The subdrains, which constituted approximately half of the total footage of the subcontract, are 8-inch plain-concrete pipe placed in ditches twice its external diameter. Joints were yarned in their bottom third only and adjacent lengths of pipe were butted together and then withdrawn ¼ inch. The joints were then covered with a 10-inch strip of burlap to exclude small particles from the open joints. The area around the pipe and for 12 inches above it was backfilled with porous material having the following specified grading:

Sieve Size	Per Cent Passing
1-inch	100
¾-inch	90-100
No. 4	0-10

Crushed stone from the quarry which furnished the base stone was used as pervious backfill. This material was loaded from stockpiles on the site by two ¾-cubic-yard Speeder shovels, dumped from trucks on the trench bank, and shoveled into place by hand. Above the porous backfill, the remainder of the excavated material was bulldozed into the trenches by a Caterpillar Thirty-Five and an International TD-14 and compacted by pneumatic tampers which obtained their air from two Ingersoll-Rand air compressors, one 60 and one 210-cubic-foot machine. Additional compaction was secured by truck-wheel rolling in locations where it was possible to utilize this method.

Fiber ducts for electrical wiring were also installed by this contractor.

Grading

Since the site of the airport was comparatively level, much of the excavation consisted of digging far enough below the natural ground surface to provide for the construction of the two base courses and completing the shoulders and area grading to approximately finish grade. This seriously impaired natural drainage during construction.

The grading contractors, A. B. Lynch & Co., Milwaukee, Wis., and Nelson, Mullen & Nelson, Inc., Minneapolis, Minn., were fortunate in having a natural sub-drainage system available and deserve commendation for their successful use of it. Underlying the entire area at a depth of 6 to 10 feet was a stratum of water-bearing gravel which the contractors used to carry off surface water by digging ditches the width of a dragline bucket down to the gravel at intervals of approximately 300 feet. The ditches were staggered on alternate sides of the excavation, and extended perpendicularly to its center line for 50 feet, so sloped and deepened as to discharge surface water into the water-bearing gravel which carried it away.

The contractors substantially completed the grading before winter necessitated the cessation of operations, utilizing two 18-yard, six 12-yard, one 9-yard, and two 15-yard LeTourneau scrapers, two 19-yard and one 16-yard Gar Wood, one 14-yard and one 8-yard LaPlant-Choate scraper, and one Tour-

napull. The sixteen scrapers were pulled by Caterpillar D8 tractors, with one extra available, while two Allis-Chalmers HD-14 tractors, one Caterpillar Seventy-Five, an RD7, four D7 tractors, and two International tractors, an M and a 35, were utilized for pushers, bulldozers, and pulling the four double-drum LaPlant-Choate, two Bros, an American Steel Co., a Caterpillar, a Slusser-McLean, an Adams, and a Heil sheepsfoot roller. A 9-wheel pneumatic-tire roller was also used in finishing the subgrade. In the sand-clays and sandy silts composing the dirt to be moved it was found that heavily loaded sheepsfoot rollers were less effective than those more lightly loaded so in most cases part of the ballast was removed from the rollers.

To provide water for compaction, the contractor installed a wellpoint system of thirty 1¼-inch points, driven 12 to 14 feet deep at spacings of from 5 to 12 feet, with a 6-inch Rex centrifugal pump discharging into a 5,000-gallon steel tank elevated to discharge by

gravity into three 1,000-gallon tank trucks. Under the weather conditions encountered during construction, however, it was necessary to manipulate the soil for drying to the optimum 11 per cent moisture far more frequently than it was necessary to sprinkle it.

Grading operations were continued through two 10-hour shifts for approximately the first month of work, after which the shortage of operators made it advisable to reduce working hours to a single 10-hour shift. While night operations were in progress, twenty Kohler 1.5-kw light plants were used to provide electricity for the twenty 15-foot-high towers, each carrying five 300-watt bulbs, which were moved about the site as needed.

The necessity for removing unstable soils under approximately 40 per cent of the runway areas, and the rehandling of materials to provide the best possible subgrade, increased the grading quantities about 34 per cent above the original estimate.

(Continued on next page)



Now A PARSONS Wheel TRENCHLINER



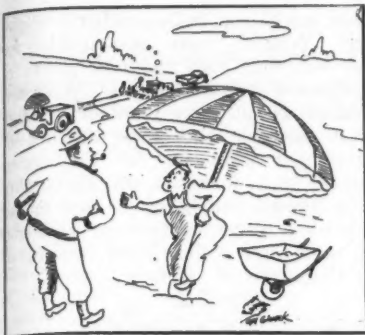
Get the facts on the new Parsons 200 Wheel Trenchliner today. Modern, designed in 1945 for 1945. Outstanding performance on tough pipeline jobs—in gumbo, clay, shale or compacted sand—because all the latest improvements are incorporated in the new Parsons 200 Wheel Trenchliner. Ask for your Parsons 200 Wheel Trenchliner Catalog today. It's just off the press.

THE PARSONS COMPANY

KOEHRING SUBSIDIARY NEWTON, IOWA

TRENCHING EQUIPMENT





Grading and Base For New Runways

(Continued from preceding page)

Sub-Base Construction

Construction of both sub-base and base was performed by the general contractor. For the coarse fraction of the sub-base he used a soft limestone (Los Angeles rattler-test loss of 30 to 45 per cent) from a commercial quarry which had been previously operated at Waterloo and which he reopened for this job. Sub-base material met the following specified grading:

Size Opening	Per Cent Passing
2-inch	100
3/4-inch	50-100
No. 10	10-55
No. 40	4-25
No. 200	2-10

This material was loaded, 35 per cent from a stockpile on the site and 65 per cent from a sandy gravel pit, by Speeder 3/4-cubic-yard cranes with clamshells and hauled an average distance of 1 1/2 miles in dump trailers carrying an 8-cubic-yard load and pulled by tractors. The material was dumped in windrows to provide enough for an 11-foot width of 4-inch compacted thickness. This was sufficient under most of the runways but was increased to 7 inches for 500 feet at their ends and under the taxiways and apron. Where the additional thickness was needed, the operation was the same as for the single course. Five windrows were placed on a taxiway and fourteen windrows for a runway, and, after preliminary shaping by Caterpillar motor graders, were mixed by a Jaeger traveling plant. Water was added if necessary to obtain the optimum 6 per cent moisture.

The windrows were mixed in succession for a distance which was often varied with the progress of the grading operations, after which final spreading was done by the Caterpillar motor graders, and the material was compacted by four rubber-tired rollers pulled by McCormick-Deering wheel tractors. Final finishing was done by two 5-ton steel-wheel pull-type rollers. Working two 10-hour shifts, the contractor was able to average 1,500 cubic yards daily of properly compacted sub-base and had completed 81 per cent of this item when work shut down for the winter.

Plant-Mixed Base

Base material met the following specifications:

Size Opening	Per Cent Passing
1 1/2-inch	100
1-inch	70-95
3/4-inch	55-95
No. 4	30-50
No. 40	10-25
No. 200	3-10

The fraction passing the No. 200 sieve could not exceed one-half of that passing the 40-mesh sieve. The material

passing the No. 40 sieve was required to have a liquid limit of less than 25 per cent and a plasticity index of less than 4 per cent.

The base material was mixed in a pugmill at the commercial plant which furnished portions of the sub-base material, sufficient water being added during mixing to secure the 8 per cent optimum moisture at the time of spreading and compaction. The mixed material was hauled in steel-body dump trucks and discharged into a Jaeger spreader, pulled by a motor patrol, and so adjusted as to spread an amount sufficient to provide a 3-inch compacted course.

Ordinarily the base under the taxiways was placed 52 feet wide in five operations of the spreader and compaction was continuously progressive behind it. On the wider runways, however, a section 1,000 feet long and 11 feet wide was usually placed on the center, after which the operation was continued in the opposite direction down one side of the 1,000-foot section, then back up the

other side to obtain the 152-foot width required. The base was 70 per cent complete when operations were suspended for the winter.

Major Quantities

The major bid items of the contract include the following:

	Lump sum
Clearing and grubbing	757,000 cu. yds.
Unclassified excavation	1,170 cu. yds.
Granular backfill	57
Manholes A	15
Manholes B	6,944 lin. ft.
3-inch duct (first run)	11,588 lin. ft.
3-inch duct (second run—same trench)	50,420 cu. yds.
Type A sub-base	86,720 cu. yds.
Crushed-stone base course	540 tons
MC-1 prime coat	30,880 tons
Surface course, hot-mix asphaltic concrete	4,530 tons
A, 2-inch thickness	2,000 tons
B, 2 1/2-inch thickness	28 tons
Asphaltic cement in surface	305 tons
RC-2 in tack coat	3,470 tons
RC-2 in seal coat	
Cover aggregate for seal	

Personnel

The 1,704-acre site selected for the construction of the Waterloo, Iowa, Municipal Airport is on a relatively level location 5 miles northwest of Waterloo and 3 miles from Cedar Falls. Both mu-

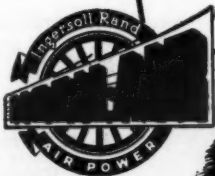
(Concluded on next page)

WORKING AROUND THE CLOCK FOR VICTORY

At an assembly depot in England, the U.S. Transportation Corps set up these two air compressors to supply car-construction lines with the air power needed for riveting hammers, grinders, paint sprayers, etc.

The compressors began operating 24 hours a day, 7 days a week, except for a 4-hour shut-down on Saturday afternoons while the men were undergoing military training. It was only then that proper maintenance could be given. When we heard about these machines, months later, they were still operating 19 hours a day, 7 days a week.

Actually, these are Model IK-315 diesel-driven MOBIL-AIR portable compressors with their wheels removed. Besides providing a reliable source of air power, they save fuel. Whenever full capacity is not required, they automatically slow down and work at three-quarter or half speed. Thus wear and tear, and fuel consumption, are less. The machines last longer. These are some of the reasons why contractors will want MOBIL-AIR for their post-war jobs.

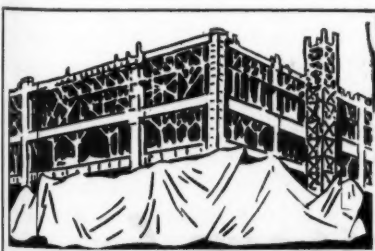


Ingersoll-Rand
11 BROADWAY, NEW YORK 4, N. Y.

Thousands of MOBIL-AIR compressors, and the I-R tools that use the compressed air, are giving equally valuable service to the Armed Forces of the United Nations all over the world.

2-539A

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • OIL AND GAS ENGINES



SPEED WORK WITH

Fultex

**TARPAULINS
and WINDBREAKS**

Protection when you need it can save many man hours on the job. FULTEX Waterproof Tarpaulins and Covers are well known and widely used. They have proven their quality through heavy duty and long wear. You get your money's worth when you buy FULTEX.

Quick delivery from stock on standard size covers.

FULTON BAG & COTTON MILLS

Manufacturers since 1870

Atlanta St. Louis Dallas Minneapolis
New York New Orleans Kansas City, Kans.

Grading and Base For New Runways

(Continued from preceding page)

nicipalities have extended their city limits to the airport site to assure control of building in its vicinity, thus eliminating possible future menaces to the safe use of the airport. Land was provided by the City of Waterloo and construction was paid for from DLAND funds by the Civil Aeronautics Administration. Area adequate for all necessary hangars and administration buildings is available and the construction of these is contemplated as a post-war project.

The contract for the construction of this airport was awarded by the Fifth Regional Office of the Civil Aeronautics Administration on July 20, 1944, to the Concrete Materials & Construction Co. of Cedar Rapids on its low bid of \$1,188,019.60. Work was started immediately on Schedule 1 which included grading and drainage, and on September 15 on Schedule 2, including the electric ducts, sub-base, base, and paving. Time allowed for completion was 75 calendar days on Schedule 1 and 90 calendar days on Schedule 2. Subcontracts awarded by the general contractor, for which R. H. Neighbour was Superintendent, included the following: grading to A. B. Lynch & Co., Milwaukee, Wis., and Nelson, Mullen & Nelson, Inc., Minneapolis, Minn.; storm drains, subdrains, and ducts, to O. N. Gjellefeld, Forest City, Iowa; and bituminous surfacing to Payne & Dolan, Inc., Chicago, Ill. A. W. Keyes was General Superintendent of grading operations, assisted by P. Kaiser and J. Brady, and W. Jones was Engineer for the grading contractors. Fon D. Steel was Superintendent and John Devin was Engineer for Gjellefeld, and A. L. Heyer was Superintendent for Payne & Dolan.

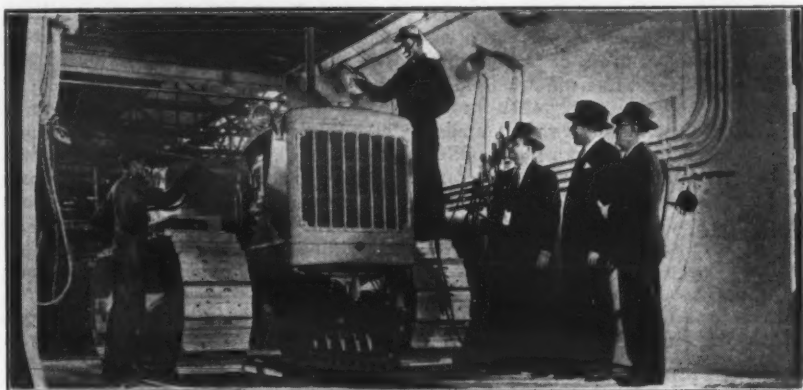
For the Civil Aeronautics Administration, the work was under the supervision of the Fifth Regional Office at Kansas City, Mo., of which Raymond C. Herner is Chief of the Airways Engineering Branch. Alvin L. Swank was Resident Engineer, assisted by John W. Barber, R. C. Sagnees, and A. L. Bollman.

More Vermont Towns Improve Road Scenery

There are now twenty-seven more towns in Vermont through which you can ride with a better chance to see the scenery than you could only a few weeks ago. At annual town meetings in those twenty-seven towns they voted to forbid the erection of any advertising signs over 40 square feet in area. This makes a total of twenty-nine Vermont towns which do not tolerate large commercial billboards along their highways. As is generally the case in restrictions of this type, the action does not apply to signs which pertain exclusively to the property on which they are located or to the business conducted on that property.

There was a big fight at all of the town meetings by the big billboard men who used the argument that billboards help win the war. The good citizens of Vermont, however, felt that they wanted scenery rather than signs.

The anti-billboard movement in Vermont started six years ago with a state law requiring that all rural signs be placed one linear foot back from the road for each square foot in the sign. A strict enforcement of this law has resulted already in eliminating about 75 per cent of the rural billboards. The Vermont Association for Billboard Restriction, which is affiliated with the National Roadside Council, initiated the action taken by the State and the towns.



Caterpillar officials were on hand to watch painters apply the first well known "Highway Yellow" to be used on Caterpillar equipment in several years.

Caterpillar Yellow Is Back in Service

There was considerable rejoicing in Peoria recently when a Caterpillar diesel tractor appeared resplendent in a coat of the familiar "Highway Yellow", instead of the utilitarian coating

of the past few years. Several officials of the Caterpillar Tractor Co. were on hand for the momentous occasion, to watch as the spray painters applied the color which has been closely identified with Caterpillar products for many years.

A scarcity of chrome, one of the

main ingredients in Caterpillar's "Highway Yellow", was responsible for the fact that even the few pieces of equipment turned out for important civilian use all were painted the olive drab used on the large amount of equipment produced for the armed forces. Now, however, the availability of a limited supply of chrome makes possible a return to the color preferred by users and dealers alike because of its visibility and safety.

Downs Joins Schramm

Francis J. Downs has recently joined the staff of Schramm, Inc., West Chester, Pa., manufacturer of a line of air compressors. Mr. Downs, who was formerly Office Manager for the Highway Contractors' Division of the American Road Builders' Association, will represent Schramm in the territory comprising Nebraska, Kansas, Missouri, Kentucky, and the southern part of Illinois and Indiana, with headquarters in St. Louis, Mo.

Is YOUR State



IT MAY COME Tomorrow!

Peace—and with it the problems of reconverting industry and reinstating 10 to 20 million persons in gainful, productive occupations. How is it to be done? By government support of the unemployed, with leaf-raking projects of no permanent value, and subsistence only for the worker? Or by planned, durable projects, of lasting economic value to the community, and providing man-size wages and a rising standard of living?

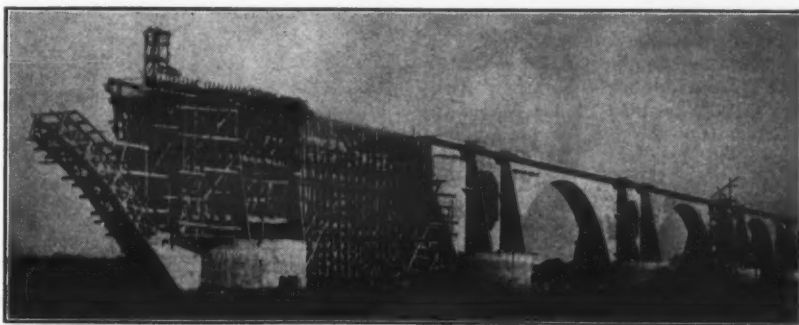
Don't write to your Congressman! Congress has done its part, for the moment. Write to your State, County and Municipal Officials. Insist that they organize, plan and participate in this sound, constructive program.

Long Concrete Bridge Being Built in Brazil

Now under construction in Brazil, the bridge over the Paraguay River at Porto Esperanca will be the longest reinforced-concrete span thus far erected in that country. It will have a total length of 6,562 feet, with the main channel bridged by four spans of 296.3 feet and a central span of 360.9 feet.

The river at this point is nearly 3,281 feet wide and is divided into two branches by an island 1,315.7 feet wide, with a 1,542.1-foot channel on one side and 370.8 feet on the other. The smaller channel will be bridged by two spans of 185.4 feet each. Because of floods it is necessary to provide a clearance of 65.6 feet above low water. This necessitated long approaches of 44 spans.

The entire bridge will be completed by the end of this year and will carry a highway and also a part of the 636-kilometer (395-mile) railway now being built by Brazil on Bolivian territory from Corumba to Santa Cruz.



The bridge now being built by Brazil over the Paraguay River at Porto Esperanca will be that country's longest reinforced-concrete span, with a total length of 6,562 feet. It will carry both a highway and a railroad.

Guard Rail Available

The Tuthill Spring Co., 762 W. Polk St., Chicago 7, Ill., has announced that Tuthill highway guard rail is once more available and that shipments can be made promptly. New equipment has been installed to increase the output of the painting department by spraying

the prime coat of red-lead paint on the guard-rail panels while the panels are carried on a conveyor in and out of the spray room. The panels are warmed, before painting, by a warm air blast to shorten the drying time.

Descriptive circulars on Tuthill highway guard rail and detail drawings may be secured from the company.

Ready with its PLANS?

ACT NOW—TO ASSURE VITAL POST-WAR HIGHWAY CONSTRUCTION PROGRAM—FIRST STEP TOWARD PROVIDING MILLIONS OF JOBS

POSTWAR employment is not merely a national concern. It is a state concern. It is a county concern. It is a municipal concern.

Adequately planned public works is a constructive backlog to America's future prosperity. Sound planning now will create barriers to mass unemployment tomorrow—and eliminate make-shift leaf-raking projects that cost money but do not create wealth.

Now is the time to get your public work projects in blueprint form. Now is the time to plan, with complete specificity, the Highways, Airports, Sewage Treatment and Water Purification Projects that will provide productive employment when it is needed.

How much work should be planned, how long it should be carried on, in order to achieve the desired ends, are questions receiving various answers in different places. The American Association of Highway Officials' estimates of construction needed immediately is over seven billions of dollars worth.

The American Road Builders' Association envisions an annual investment of three billions of dollars in roads, for an indefinite period. Events still to come will show what is actually necessary or practical, but a definite starting point, and a substantial portion of the work to be done immediately, are provided by the Federal Aid Highway Act of 1944. This measure contemplates a billion dollars worth of highways to be built each year, for three years. This will amount

to a lot of roads, and will provide a lot of jobs. Larger programs may be in prospect, or needed to attain our full objective, but the Federal program will conflict with none of them, and has the merit of being ready to start as soon as individual States have prepared plans, and have appropriated their share of the funds.

Furthermore, under the provisions of the Federal Aid Highway Act of 1944, the Federal Government will defray one-half the costs of surveys and plans for highway construction for your State. Under these circumstances what State can afford not to participate? What reason is there for any state to delay the preparation of its plans?

Communicate with your State Highway Department at once. Make sure your State will be ready, when the day of Victory dawns, to carry on its share of this great and vital program.

American Road Builders' Association has issued informative booklets on the subject of road building in relation to national economic stability.

Highway Departments, Civic Groups, Commercial Clubs and individuals should study these, to be well informed on the full significance of this program.

Write for "The Road Ahead" and "Blueprint for Post-War Roads—and Jobs." Address, American Road Builders' Association, Washington, D. C. or Link-Belt Speeder Corporation, Chicago 9, Ill.

LINK-BELT SPEEDER CORPORATION

CHICAGO 9, ILLINOIS • CEDAR RAPIDS, IOWA

BUILDERS OF THE MOST COMPLETE LINE OF CRAWLER AND WHEEL-MOUNTED CRANES, SHOVELS AND DRAGLINES FOR EFFICIENT LOW COST HANDLING OF MATERIALS IN THE INDUSTRIAL, EXCAVATING, CONSTRUCTION AND ROAD BUILDING FIELDS . . .

Careers for Youth In Road Construction

Coming Period of Unparalleled Activity in the Highway Industry Offers Unlimited Opportunities

WHEN the war in the Pacific has ended, we shall enter upon the greatest era of highway construction that this country has ever known. A vast program will be carried out in the next few decades, and its effect on our national life will be far-reaching. This fact is recognized by government agencies, highway departments, engineers, business men, and economists. Road building will be a vital part of America in the days to come.

The part which any industry or profession can play in the national life of a country depends upon the continuous inflow of new blood and initiative, brought to it by the entry into the field of young men with the training, enthusiasm, and vision to keep that industry at a peak of service to the country at large. For the road-building industry to meet its obligations in the years to come, it will need trained and experienced men to build these highways of tomorrow. We believe that the readers of CONTRACTORS AND ENGINEERS MONTHLY are interested in the continual growth of the road-building industry, and many of them have sons, younger brothers, nephews, and young friends who are even now giving thought to their future business or professional careers. For this reason, we are presenting a recent statement in "Down the Road" by Charles M. Upham, Engineer-Director of the American Road Builders' Association, on this subject.

Challenge to Schools

Mr. Upham says, "This need for more trained road builders presents a challenge to our technical schools and universities. Highly specialized knowledge is required by the highway engineer, and special courses should be developed to offer it to young men who can visualize the bright future in this interesting profession.

"Let's examine some of the things the highway engineer ought to know. Assuming a basic schooling in the principles of civil engineering, he should be acquainted with machinery, for road building today is a highly mechanized industry. He should know something of chemistry, geology, and metallurgy as it applies to his work. Because highways project themselves into the economic development of states and communities, he should have some familiarity with political economy, finance, and administration. He should be able to handle efficiently men, equipment, and supplies, and a smattering of commercial law won't hurt him. These are some of the things which will contribute greatly to success as a highway engineer. It is not a narrow profession by any means.

Practical Training

"College courses should combine practical training with classroom work as a preparation for a road-building career. During the summer, the student can work on actual construction jobs or in the plants of manufacturers or producers of construction equipment and materials. As a suggestion, during the student's freshman vacation he might act as a rodman. His sophomore year might see him advanced to chief of party. His junior year's vacation is devoted to drafting; and upon graduation, he is prepared for the post of resident engineer. In this way, the student has an advantage in actually being a student the year round and his advancement is consequently more rapid.

(Concluded on next page)

Careers for Youth In Road Construction

(Continued from preceding page)

Field trips to road projects of every type should round out his vacation experience.

Appeal to Youth

"Being on the job and a part of it is inspirational. Our potential highway engineers, being healthy young Americans, like the out-of-doors. They like to feel they are part of something big. Subduing the natural terrain with cuts and fills, bridges, culverts and embankments, long stretches of gleaming highway—this all has the thrill of a contest. Add a touch of glamor to a job, and no matter what the demands, many will choose it. Thousands of youths turn to railroading, seafaring, newspaper work, or engineering because they expect to 'get a kick out of it'. Road building is not unlike these.

"Under the so-called G. I. Bill of Rights, veterans of the World War may secure college or vocational training upon being discharged. During the war, thousands of young men learned to operate bulldozers, tractors, shovels, scrapers, and many other machines used in road and airport building. Give these 'cat-skinners' in khaki technical classroom training under the bill, and they will emerge as fine a lot of construction men as any highway department or highway contractor could wish.

"After months and years of military discipline, the returned veteran may very likely be undecided as to what he wants to do in civilian life, but he will want to do something. Naturally he is asking, what will this or that employment offer me?

What the Work Offers

"We feel that any young man with a bent for engineering will find this specialized branch an interesting field of endeavor whose rewards and compensations are in direct ratio to his ability and energy. It will mean hard work. It will require good health and a constitution that can take it. It will require a considerable period of training. It won't be a cinch or a sinecure. But it will pay off in the gold of accomplishment and the satisfaction of contributing something tangible to our national life.

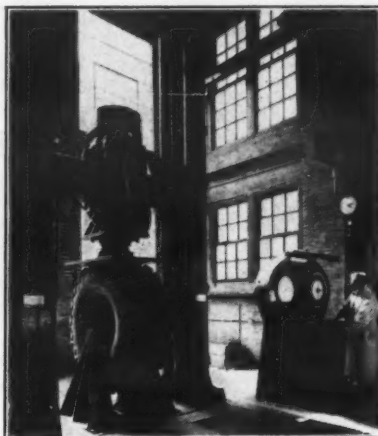
"What does it offer? A job at reasonable wages and a chance for advancement. What more could anyone ask in a field so rich in opportunity? Young America does not have to be promised the presidency of a company to induce him to go to work. What he wants is a chance, and we feel that the chances in road building are excellent. The

rest is up to him. If he makes good, he wins. That is the American way."

With Mr. Upham, we hope that a considerable number of young men will take this suggestion to heart. We hope too that heads of colleges and universities will give the matter of special road-building instruction serious consideration in making up their engineering schedules for the post-war years. And lastly we hope that the highway engineers and contractors will do their part in encouraging youths to enter the highway field in which there is so great a challenge for successful venture and so promising an opportunity for service to the country.

Giant Testing Machine For Off-the-Road Tires

One of the world's largest tire-testing machines has recently been installed and placed in operation at the plant of the Goodyear Tire & Rubber Co. at Akron, Ohio, for use in conducting de-



A large Earth Mover tire undergoes a deflection test at the Goodyear Tire & Rubber Co.'s plant.

flection and other tests on big pneumatic tires for heavy-duty earth-moving equipment, as well as for huge airplane tires.

Designed for giant tires upon which

can be exerted pressures up to 600,000 pounds when necessary, the machine can be employed for any type of tensile or compression work within its dimension or load-capacity limits. Hydraulically operated, and supplied with three load ranges, it has a clear width of 6 feet between columns and will accommodate tires or other test specimens measuring up to 12 feet in length or height. Power for the operation of the machine is supplied by a motor for driving the giant screws and locating the height of the crossheads. The unit also has a similar motor for developing hydraulic pressure for the loading cylinder.

More scientific experiments and tests will be necessary to keep abreast of the larger and more complicated post-war equipment, W. E. Shively, Manager of Tire Design for Goodyear, stated. Looking towards the future, the company has installed this machine which is expected to provide tests to determine deflection characteristics of any type or size of tire which can be foreseen.

AIR POWER THAT BEATS SCHEDULES



KNOW YOUR

BLUE BRUTES

Your Blue Brute Distributor will gladly show you how Worthington-Ransome Blue Brute construction equipment will put your planning on a profitable basis and prove that there's more worth in Worthington-Ransome. Act now! His name is listed on page 00. The number beside his name indicates the Blue Brutes he handles.

1. Blue Brutes include: Pavers, Concrete Spreaders**, Concrete Mixers, Concrete Placing Equipment, Big Mixers, Finishing Machines**, Pneumatic Placing & Grouting Equipment, Truck Mixers, Plaster & Bituminous Mixers, and accessories.

2. Blue Brutes also include: Diesel, gasoline and electric driven Portable Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs; Rock Drills and Air Tools in a wide range of weights and sizes; Contractors' Pumps.**

**Postwar Products

On those jobs you win with a sharp pencil, there's no room for compressors and air tools that waste air or have a habit of quitting at the wrong time. Avoid interruptions and air-power losses by using Blue Brutes.

Let's take a 315' Blue Brute Portable Compressor, for example. You'll like the way light, tight, quiet Feather* Valves help squeeze the most air out of each gallon of fuel... the way special unit coupling in 3-point suspension cushions engine and compressor against vibration, shocks, distortion... the way the smooth-run-

ning Diesel or gasoline engine drives the compressor. And especially will you like the way it powers such air tools as Rock Drills, Paving Breakers, and Wagon Drills.

If you don't know it already, it will pay you now to investigate why a Blue Brute air-power team beats construction schedules and keeps costs low by saving hours and dollars by speeding up the work. You'll find, as others have before you that there's more worth in Worthington. Your nearest Blue Brute distributor is listed on page 21.

H5-13

Get more WORTH from air with WORTHINGTON

BUY BLUE BRUTES



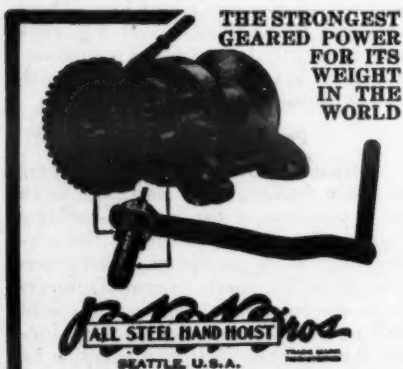
Compressors from 60 to 500 cu. ft. capacity in mountings to suit all jobs. Rock Drills and Air Tools that have

always set the pace for easy operation—available in a wide range of weights and sizes.

WORTHINGTON



Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Melrose, Mass.



THE STRONGEST
GEARED POWER
FOR ITS
WEIGHT
IN THE
WORLD

Compact—Powerful—Safe

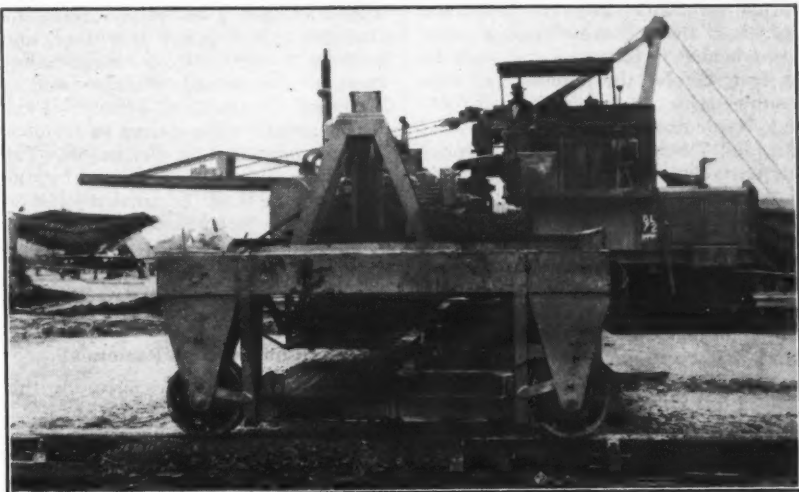
STANDING ROOM ONLY FOR DURATION

Beebe Bros. All-Steel Hand Hoists carry the highest resale value of any piece of equipment in the world. If you have one not in use, sell it. Many more than are available are urgently needed in the win-the-war program. Thanks.

BEEBE BROS.
2724 6th Ave., So., Seattle 4, Wash.

Machine Sets Dowels At Contraction Joints

A machine has been developed in California which does away with all supporting chairs and other devices for holding dowels in place at contraction joints in concrete slabs on runways or highways. This Allen Doweler, developed by J. A. Golden, Superintendent for the M. H. Golden Construction Co., San Diego, Calif., rides on the steel road forms, carrying a supply of dowels which are placed by hand in a shuttle jig from which they are transferred mechanically to a hydraulic injector which inserts them in exactly the right position in the fresh concrete. The original machine was built to satisfy the engineers in charge of inspection on heavy-duty runways where considerable trouble was experienced in holding the dowels parallel to each other. There are two of these machines operating, at present, on a price-per-dowel basis and are maintained by the owner and manufacturer.



The Allen Doweler places contraction-joint dowels accurately in the fresh concrete of runways or highways.

The following tabulation shows the comparative costs for a paving job poured in 25-foot strips, and requiring 100,000 contraction-joint dowels, spaced at 12-inch centers, with 25 dowels per joint:

Old Way	
200,000 supporting chairs @ 4¢	\$8,000
8,000 tie bars, 3/8-inch x 24 feet 6 inches, @ 34¢	2,720
4,000 joint settings—labor at \$2 per joint	8,000
Total labor and material	\$18,720
New Way	
With the Allen Doweler, eliminating all chairs and tie bars, the cost would be	7,000
Actual saving	\$11,720

Complete information regarding the availability of these machines for work on runway or road operations may be secured direct from J. A. Golden, 3485 Noell St., San Diego 1, Calif., by mentioning this illustrated text.

Koehring Co. Names Indiana Distributor

Ray Dorward, R. R. No. 3, Trafalgar, Ind., has been appointed distributor for the new 205 Half-Yard excavator made by the Koehring Co., Milwaukee, Wis. He will cover the state of Indiana with the exception of Lake, Porter, La-Porte, Starke, St. Joseph, and Marshall Counties.

Worthington-Ransome Blue Brute Distributors

By referring to the advertisement on page 20, you'll learn the meaning of the (1), (2) or (1-2) beside their names.

Ala., Birmingham (1) J. D. Pittman Tractor Co.
 Ariz., Phoenix (2) Smith Booth Usher Co.
 Ark., Fort Smith (2) R. A. Young & Son
 Little Rock (1) Kern-Limerick, Inc.
 Little Rock (2) R. A. Young & Son
 Calif., Los Angeles (1) Garlinghouse Bros.
 Los Angeles (2) Smith Booth Usher Co.
 San Francisco (2) Coast Equipment Co.
 Colo., Denver (2) John N. Meade
 Denver (1-2) Power Equipment Co.
 Conn., Hartford (2) The Holmes-Talcott Co.
 New Haven (1) W. I. Clark
 Waterbury (1) Contractors Supply Co.
 Del., Smyrna (1) King-Burrows
 D. C., Washington (1) M. A. Doetsch Machinery Co.
 Fla., Jacksonville (1) Julien P. Benjamin, Inc.
 Tampa (2) S. M. Regar
 Ga., Atlanta (2) Tractor & Machinery Co.
 Savannah (1) Morgans, Inc.
 Ida., Boise (1-2) Olson Manufacturing Co.
 Ill., Chicago (1-2) Chicago Construction Equipment Co.
 Chicago (2) John A. Roche
 Chicago (1) Thomas Holst Co.
 Ind., Fort Wayne (1) American Steel Supply Co.
 Indianapolis (2) Reid-Holcomb Co.
 Iowa, Des Moines (2) Electric Eng. & Const. Co.
 Ky., Harlan (2) Hall Equipment Sales Co.
 Louisville (2) T. C. Coleman & Son
 Louisville (2) Williams Tractor Co.
 Paducah (1) Henry A. Petter Supply Co.
 La., New Orleans (1) Ole K. Olson Co.
 New Orleans (2) Wm. F. Surgi Equipment Co.
 Maine, Portland (1-2) Maine Truck-Tractor Co.
 Md., Baltimore (1) Stuart M. Christhill & Co.
 Baltimore (2) D. C. Elphinstone, Inc.
 Mass., Boston, Allston (1-2) Clark-Wilcox Co.
 Cambridge (2) W. W. Field & Son, Inc.
 Mich., Detroit (1) T. G. Abrams
 Detroit (2) W. H. Anderson Co., Inc.
 Flint (2) Gransden-Hall & Co.
 Muskegon (1-2) Lakeshore Machinery & Supply Co.
 Minn., Minneapolis (1-2) Phillips-Murphy Equip. Co.
 St. Paul (2) D. L. O'Brien
 Miss., Jackson (1) Jackson Road Equipment Co.
 Mo., Clayton (1-2) The Howard Corporation
 Kansas City (1) Brown-Strauss Corp.
 Kansas City (2) Machinery & Supplies Co.
 St. Louis (2) W. H. Reaves
 Neb., Lincoln (1) Highway Equipment & Supply Co.
 R. J., Hillside (2) P. A. Drobach
 Newark (1) Johnson & Dealman
 North Bergen (2) American Air Compressor Corp.
 N. M., Albuquerque (2) Bud Fisher Co.
 Albuquerque (1) Morrow & Co.
 Roswell (2) Smith Machinery Co.
 N. Y., Albany (1-2) Milton-Hale Machinery Co.
 Buffalo (2) Dow & Co., Inc.
 New York (2) Air Compressor Rental & Sales
 New York (1-2) Hodge & Hammond, Inc.
 New York (1-2) Railroad Materials Corporation
 Olean (2) Freeborn Equipment Co.
 N. C., Raleigh (2) Carolina Tractor & Equipment Co.
 N. D., Fargo (1-2) Smith Commercial Body Works, Inc.
 O., Cincinnati (2) Finn Equipment Co.
 Cleveland (2) S. M. Clancy
 Cleveland (1) H. B. Fuller Equipment Co.
 Cleveland (2) Gibson-Stewart Co.
 Marietta (2) Northwest Supply & Equipment Co.
 Toledo (1) Edmund Supply Co.
 Toledo (2) M. W. Kilcorse & Co.
 Okla., Oklahoma City (2) Townsco Equipment Co.
 Oregon, Portland (2) Andrews Equipment Service
 Pa., Allentown (2) H. N. Crowder, Jr., Inc.
 Easton (2) Sears & Bowers
 Harrisburg (2) N. A. Coulter
 Oil City (2) Freeborn Equipment Co.
 Philadelphia (1) Giles & Ransome
 Philadelphia (2) Metalweld, Inc.
 Pittsburgh (2) Atlas Equipment Corp.
 Wilkes-Barre (2) Kasminger & Co.
 Wilkesburg (1) Arrow Supply Co.
 York (2) George F. Motters Sons
 S. C., Columbia (2) Smith Equipment Co.
 Tenn., Knoxville (2) Wilson-Weesner-Wilkinson
 Memphis (2) Tri-State Equipment Co.
 Tex., Dallas (1) Service Equipment Co.
 Dallas (2) Shaw Equipment Co.
 El Paso (2) Equipment Supply Co.
 El Paso (1) Mine and Smelter Supply Co.
 Houston (2) Dye Welding Supply Co.
 Houston (1) McCall Tractor & Equipment Co.
 San Antonio (2) Patten Machinery Co.
 San Antonio (1) San Antonio Machine & Supply Co.
 Utah, Salt Lake City (1-2) Landes Engineering Co.
 Vt., Barre (1-2) A. M. Flanders, Inc.
 Va., Richmond (2) Highway Machinery & Supply Co.
 Wash., Seattle (1) Columbia Equipment Co.
 Seattle (2) Star Machinery Co.
 Spokane (2) Andrews Equipment Service
 Spokane (1) Columbia Equipment Co.
 W. Va., Charleston (1) West Virginia Co.
 Fairmont (2) Interstate Engineers & Constr., Inc.
 Wisc., Milwaukee (1) Mekeel Engineering Co.
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New Concrete on Old, A Sand Base Between

Sand Foundation Course Raises New 8½-Inch Plain-Concrete Pavement To Proper Grade: Topsoil Salvaged

✦ A 22-FOOT plain-concrete pavement of 8½ inches uniform thickness was recently completed for a distance of 1½ miles on State Route 50 between the villages of Ridgeway and Britton in southeastern Michigan. The work was done for the Michigan State Highway Department by Taylor Brothers Co., Birmingham, Mich., for \$75,834.65, and included the necessary drainage structures and the placing of a 12-inch minimum layer of sand as a foundation course for the new pavement.

The old road was an 18-foot concrete pavement laid in 1921, and as the grade of the new road was to be raised throughout its length the old pavement could remain undisturbed except in three sections. In the center of the job 420 linear feet of paving had to be removed because of the relocation of a curve, and at both extremities the old pavement was torn out so that the new concrete could tie in to the existing roadway. For keying in on the west end, only 170 linear feet of pavement had to be removed, but on the east end, where a hump remained as evidence of a crossing of the Detroit, Toledo & Iron- ton Railway, about 800 linear feet was taken out in order to make a smooth connection with the existing road.

The pavement was first broken by a 4,200-pound steel weight dropped from the boom of a Lorain 75-A shovel which operated at all three areas. The shovel then loaded the broken material into four Ford 1½-ton trucks on which 5-yard-capacity bodies had been built, and the material was distributed as fill along the road, the voids and interstices in the rubble being filled with sand.

As the right-of-way had been extended from 66 to 120 feet, the Consumers Power Co., the Britton Telephone Co., and the Tri-County Telephone Co. had to move their pole lines back to the limits of the new takings. The old road had shoulders varying in width from 4 to 8 feet, and since the new design called for 8-foot shoulders and a 22-foot pavement the sand sub-base was laid 40 feet uniform width at the top and 50 feet at the bottom, or whatever width was necessary to meet the side slopes. While the minimum thickness of the sand sub-base is 12 inches, this was exceeded in a few instances where the difference in elevation between the existing pavement and the finished grade was greater than that depth.

Borrow Material

A borrow pit located 3 miles northwest of Ridgeway at the western end of the job supplied the necessary 28,145 cubic yards of sandy gravel for the sub-base. The Lorain ½-yard shovel worked in the pit, loading twelve Ford trucks which did the hauling. As the trucks continually traversed the fill sections, no compaction by other rolling was necessary. When the trucks dumped their loads, an Allis-Chalmers tractor with bulldozer pushed the fill into place, and final shaping was done by a Caterpillar No. 12 power grader. Topsoil for use in the stabilized earth shoulders and for surfacing the slopes was salvaged from the excavation of swamp ditches which parallel the road 50 feet from the center line.

Local traffic was maintained during the grading operations but through traffic was detoured over a parallel county road 1 mile to the north.

Drainage and Paving

Grading and drainage work, which

started on September 11, 1944, was rushed so that concrete paving could begin before October 15 and thus be finished before the coming of cold weather. One 10-foot-wide x 6-foot-high box culvert, 30½ feet long, was extended 7½ feet on each side under the new road section, while a new 56-foot culvert was laid with 24-inch reinforced-concrete pipe. Rather than mar the appearance of the well kept lawns in front of many of the houses along the road by digging a drainage ditch, tile pipe, 12 to 36 inches in diameter, was laid 50 feet off the center line and 2 to 3 feet below grade.

Concrete Paving

As soon as the sand sub-base was compacted and shaped, concreting got under way with the setting of 4,000 feet of new Metaform road forms over which was run a Buckeye R-B Fine-grader for shaping the subgrade. A concrete batching plant with Butler bins was set up in a central location and was serviced by a Koehring crane

with a clamshell bucket. A Ransome dual-drum 34-E paver was used, and finishing was done by a Jaeger-Lake-wood double-screed machine and a Koehring Longitudinal Finisher. Paving operations were started on October 19, and completed on October 31. The concrete pavement was cured by the wet-straw method. Expansion joints of 1-inch-thick premoulded bituminous material were set at 240-foot intervals while contraction joints were spaced 40 feet apart. No reinforcing was used in the 8½-inch uniform slab.

Quantities and Personnel

The major quantities involved in this contract were:

Removing old pavement	2,948 sq. yds.
Excavation, earth	42,936 cu. yds.
Culverts, reinforced-concrete pipe, 12 to 36-inch	314 lin. ft.
Culverts, plain-concrete pipe, 12 to 30-inch	204 lin. ft.
Sewer pipe, 12-inch	516 lin. ft.
Sewer pipe, 6-inch	510 lin. ft.
Tile underdrain, 12 to 36-inch	420 lin. ft.
Concrete pavement, 8½-inch uniform	19,710 sq. yds.

The project was opened to traffic on November 10 and the remainder of the

work was completed this spring. C. Smith was Superintendent and Gerald Benedict, Assistant Superintendent, for Taylor Brothers, Birmingham, Mich., contractor for this \$75,834.65 grading and concrete-paving project. Charles M. Ziegler is Michigan State Highway Commissioner.

Appointments at Douglas Fir Plywood Association

J. D. Long, who has been temporarily heading the Research Department of the Douglas Fir Plywood Association, Tacoma, Wash., has resumed his agricultural and educational work for the Association which was curtailed in recent years because of the war. Succeeding Mr. Long, John D. Ritchie has been made Chief of the Research Department after having spent the past four years as head of the Inspection Department. George W. Williams, a member of the inspection staff for the past two years, now fills the post of Chief Inspector.



UNPRECEDENTED FEATS IN PILE DRIVING

McKiernan-Terry Pile Hammers have long been associated with outstanding construction projects . . . for example, the largest earth dam in the world at Fort Peck, the longest bridge in the world at San Francisco, the largest of all man-made things, Grand Coulee Dam.

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Topography Controls County Road Program

(Continued from page 2)

enough to reach and bring up this clay for a surface over the sandy road. Many places in this locality along the brakes and ravines have outcroppings of gravel beds usually mixed with enough clay for a binder for good road-surfacing material. The Oklahoma State Highway Department has used a great deal of gravel from these pits on state roads throughout the county. Blaine County has been using the gravel where the haul is not too long to make it uneconomical.

The part of the county sloping towards the South Canadian River, with its high ridges and deep ravines, is very difficult country for the construction of roads, and a great many large culverts are necessary, making the job expensive for construction as well as maintenance.

Evolution of County Roads

Following the passage of the new road law of 1915, a system of county roads was laid out to connect the towns of the county with the related towns of the adjacent counties and to provide farm-to-market roads extending out from each town through its trade territory as the law required, up to and not exceeding 10 per cent of the total mileage in the county. These roads were to be constructed and maintained by money received from the state auto and gasoline tax. The law also provided for a county engineer to make surveys, plans, and profiles of the roads and bridges to be constructed. These plans had to be approved by the State Highway Department before any money could be expended on the work.

In the evolution of road construction and improvement, nearly all of the town connecting roads have been taken over by the State as Federal and state highways, a total of 107 miles. This leaves the remainder of the system for improvement and maintenance by the county.

During the past few years a change has been made in the school system, consolidating the rural school districts with the town and city schools, and taking the children to school in buses. This is also causing an evolution of the county road system to include all school-bus and rural-mail routes.

Financing Highway Work

Blaine County has not progressed enough financially to be able to do any road paving beyond gravel surfacing of occasional stretches in the clay hills or locations that become soft and impassable after a continuous spell of wet weather.

During the eight years of Federally sponsored relief projects, most of the funds had to go towards construction. Therefore, a great many of the roads of the county went without maintenance, and deteriorated badly. Since the relief projects have been discontinued, the county officials are regrading these roads and the school-bus and mail routes. Nearly all of the money for

road work is from the gasoline tax, but since gasoline rationing the amount of money received has been greatly curtailed. This has hampered road maintenance and left nothing for new construction.

There are three sources from which county road finances came during the past year, as follows: the Commissioners made an ad valorem levy for highways amounting to \$9,000; the one cent of the state gasoline tax returned to the counties amounted to approximately \$30,000; and the levy for school-bus and rural routes amounted to \$16,517. This made a total of \$55,517 for all road purposes for the year. Most of the present work consists of maintenance, necessary repair to culverts, and regrading.

Road Maintenance

The State Constitution declares all section lines to be public roads, and through the agricultural areas of the county all section lines are opened and improved for travel. In the rougher parts of the county, such as the Gyp-

sum Hills region, and along the South Canadian River, the land is mostly used for pasture so that few roads are necessary and many of the section lines have not been opened.

All roads of the county are improved earth or gravel surfaced, requiring going over by maintainers after rainy weather when traffic cuts the surface badly. As soon as the roads begin to dry, the operators are sent out with the maintainers. Each Commissioner's district has a crew of men with a truck who do some kind of work on the roads in the area being improved by the graders. While the machines are cutting ditches and crowning the roads, the crew with trucks haul in clay, shale or gravel to surface the sandy stretches, repair wood bridges, cut brush, or grub along the roadsides. The maintenance equipment in each district consists of a tractor and heavy grader, one or two power graders, a pick-up truck, and two 2-ton trucks.

The truck crew usually consists of four to six men, depending on the na-

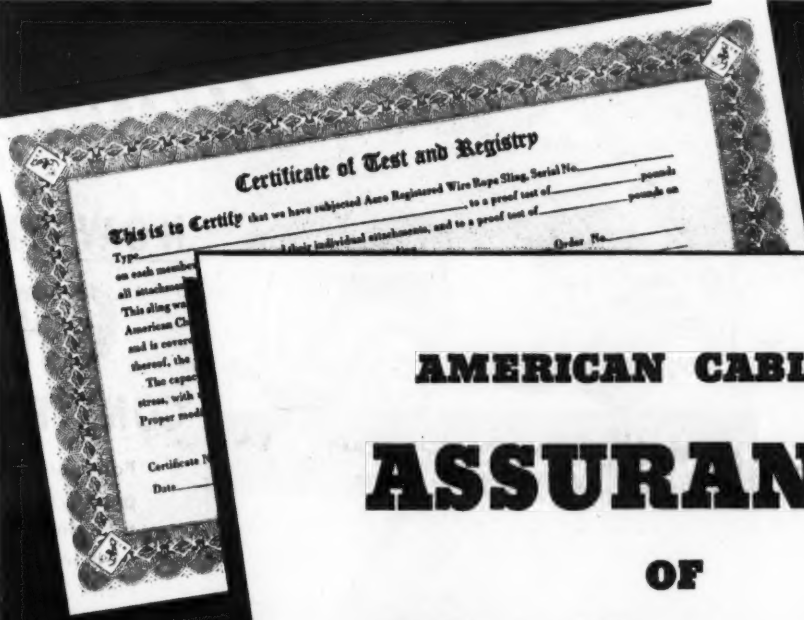
ture of the work at the time, and whether the men are available. A grader crew consists of the tractor driver and a grader operator, and a service truck with driver who alternates as tractor driver.

County Equipment

District 1 has two Caterpillar tractors, a Forty and a Fifty; an Allis-Chalmers 54 Speed Patrol; and a motor patrol powered by an International engine. District 2 has a Caterpillar D4 tractor, a Caterpillar Auto Patrol, and an Adams motor grader. District 3 has a Caterpillar diesel Fifty and two Adams motor graders. The County also has a McCormick-Deering farm tractor which is used to operate the Champion No. 4 stone crusher.

War conditions have made it impossible to get new machinery, and very few parts for the old equipment, which causes considerable delay in getting machines repaired. The older units which could not be repaired have been

(Continued on next page)



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Topography Controls County Road Program

(Continued from preceding page)

discarded or stored for the time being. The County has been working the tractor-grader outfit and motor patrol in tandem to expedite the work with less machinery than had been used before.

There is no central garage or warehouse for road equipment, but for the servicing of equipment each district has a building in its principal town. In District 1 a 50 x 100-foot building is rented in Geary. The front room is used as an office by the Commissioner and the back of the building is used for the storage of materials and trucks. The yard has room for working on machines when a breakdown occurs close enough to town for the machines to be towed in. Frequently breakdowns do not happen so conveniently, and the repairing is done at any handy location near the site, sometimes in a farm yard or under the shade of a wayside tree, with one of its limbs acting as the support for the hoist.

In District 2 a building is rented in O'Keene, in the northeast part of the county, which serves the same purpose. The Commissioner lives in Longdale, at the opposite end of the district and has his office there. District 3 uses one of the buildings at the county fair grounds at Watonga for a warehouse and garage.

All minor repairs to the county equipment and trucks are done by the operators. Larger repairs and replacements are done by a mechanic from one of the shops in town, or by the dealer from which the machine was purchased.

County Bridges

The disastrous floods of 1923 on the North Canadian River destroyed eight of the nine bridges then existing in the county. Five of these were replaced by a bond issue of \$225,000, with more substantial construction of steel trusses on reinforced-concrete piers. Two others were replaced later by wood-pile trestles, and the other two locations did not require bridges.

In 1935, U. S. 270 was located through the county running west from Watonga, and a standard Federal-type bridge of eight 100-foot spans was constructed over the river to replace the county bridge of five 100-foot spans which were taken down and rebuilt over small streams in various parts of the county with relief labor.

As the North Canadian River has the greatest mileage through the county, it has four steel bridges all of the same type, but with a varying number of spans, depending on the location and width of the river. The spans are 100-foot through Pratt trusses carrying a 16-foot roadway. The bridge farthest north on the river, the Longdale bridge, has seven 100-foot spans founded on concrete piers extending 25 feet down through the sandy bed to shale and running 12 feet above the river bed. The next bridge, in the town of Canton, has three 100-foot spans with the same type of construction for the piers.

The two bridges which serve the city of Watonga are on state and Federal highways. The original county bridge west of the town, consisting of four 100-foot spans, was replaced by a state highway bridge of eight 100-foot spans with a 24-foot roadway on concrete piers carried 20 feet above the river bed and going down to shale at 22 feet. The bridge south of Watonga was built by the State Highway Department, and partly financed by \$20,000 from the county bond issue. It has six 100-foot spans on reinforced-concrete piers carried 14 feet above the river bed. The last steel bridge on the North Canadian River is one mile east of Greenfield, and has two 100-foot spans and a pony truss

80 feet long on concrete piers. This bridge also has a pile trestle 100 feet long at the west end where the channel cut around the bridge in 1941. This trestle was intended to be temporary, as it was expected that a new span could be erected soon, but it will have to last until permission can be secured to buy the steel.

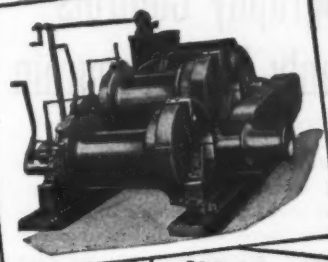
There are two more bridges on the North Canadian River, both of wood-pile trestle construction. One, known as the Rhelan bridge, was originally 400 feet long and carried a 16-foot roadway. The river has cut around it so often that it has been extended until there is no record of the true length. It is approximately 800 feet from bank to bank. Attempts to control the river have met with only partial success. The other pile bridge is located 3 miles south of the town of Canton, and is 400 feet long, built of treated wood as a relief project.

The next county bridge of importance is on the South Canadian River, having been built as a toll bridge in 1921 by the

(Continued on next page)

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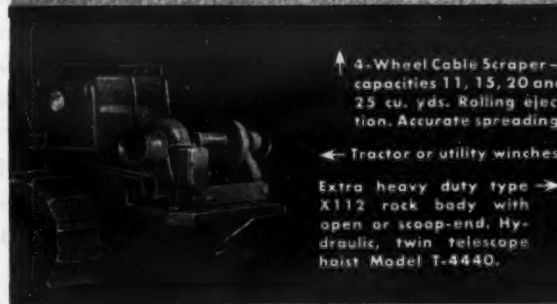
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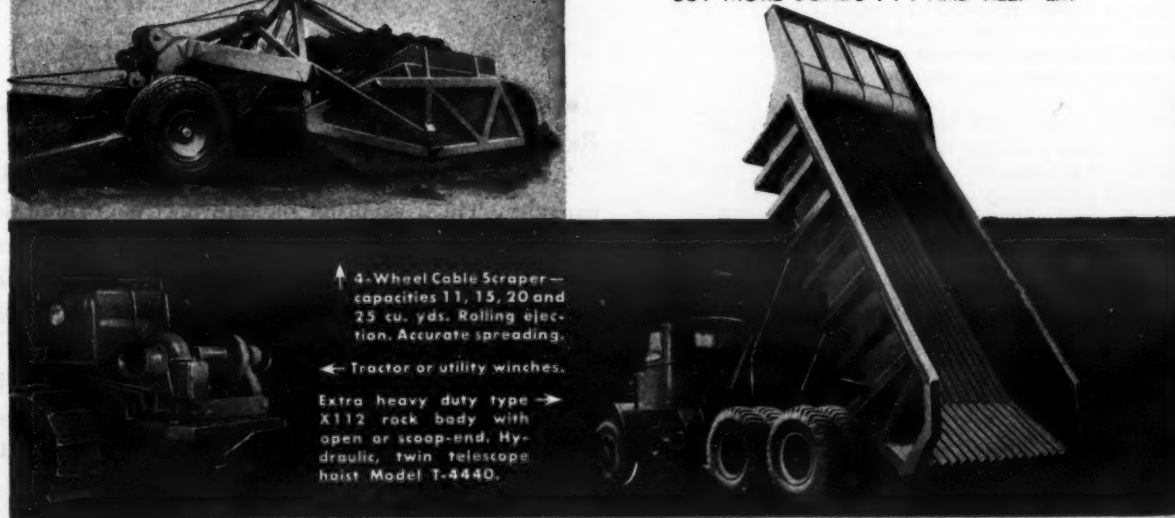
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Topography Controls County Road Program

(Continued from preceding page)

Postal Bridge Co. It is a suspension span 600 feet long between main towers with 200-foot approaches at each end, and a 16-foot roadway. It remained as a toll bridge for twelve years, carrying U. S. 66. When the State Highway Department constructed a bridge across the river 3 miles below and changed the location of U. S. 66, revenue practically ceased on the toll bridge and it was turned over to the county.

There are a number of small streams in the county with bridges of varying lengths and various types of wood trestles, concrete, and steel. The largest of these streams is Salt Creek which rises from several salt springs in the Gypsum Hills 12 miles north of Watonga. There are eight bridges on Salt Creek, each 100 feet in length. Three are of steel and the others of wood piling, except one of concrete which is a low-water bridge 100 feet long with a 16-foot roadway and a 6 x 3-foot concrete box culvert. The county has a number of these low-water bridges but the one over Salt Creek is the longest. They consist of a culvert to carry the normal flow, and a concrete slab extending from bank to bank with aprons on both the downstream and upstream sides. After the culvert is built, the sand or mud on either side is removed down to the solid bottom of the streambed and a foundation of man-size rock is placed, with mortar slushed into the cracks, up to about 6 inches of grade. On this a slab of 1:2:4 concrete is laid. The downstream apron is also of concrete, sloped down to the creek bottom with the lower edge supported by a concrete wall built up from the solid bottom to prevent undercutting by the overflowing water. The upstream edge is also supported by a similar wall to prevent seepage under the structure. The normal flow of the stream passes through the culvert, but after a storm in the hills, the flood water passes over the entire structure for a few hours, without causing any damage.

Bridge maintenance is taken care of by the county truck crews. When a report is received that a bridge or culvert needs repair, one of the truck crews is sent out with the necessary tools and materials from the district warehouse. All truck drivers and county employees are instructed to examine all bridges over which they pass and report any needed repairs.

In time of floods on the rivers, these men many times work all day and all night at the pile bridges to prevent trees and other drift from accumulating and endangering the bridge. The Federal government is building a flood-control dam on the river 2 miles above the town of Canton, which will be a great relief to county bridges. Although the work on the dam has been suspended for the duration of the war, it is understood that it will be resumed early in the post-war years. All of the structure has been finished except the closing of the river part of the dam and the construction of the spillway.

Although a great many small permanent bridges and culverts were constructed during the eight years of Federal relief, there are many more yet to be built to replace wood structures which are too small.

Industrial Conditions

The chief industry of Blaine County is farming and stock raising, although there is a flour mill at O'Keene in the north part of the county, and a cheese plant at Watonga. In the hills, 18 miles north of Watonga, on the Frisco Railroad is the industrial town of Southard, where the U. S. Gypsum Co. has its plant for mining gypsum rock and manufacturing plaster, sheetrock plasterboard, and building tile, giving employment to some 300 workers.

Organization

For administrative purposes, the county, like all counties in Oklahoma, is divided into three districts as nearly equal in population as possible. A County Commissioner is elected from

each district, at the same time, for a term of two years. The present Commissioners are Ralph Stevens, George R. Carpenter, and S. A. Wolsey, each having been elected for a third term in 1944.

In county road matters and the purchase of equipment, each Commissioner handles the business for his own district. All county money is divided three ways and each Commissioner can spend his portion in his district in any legal way he desires.

County surveyors in Oklahoma are elected by the people at the same time other county officers are elected. The duties of the County Surveyor include the surveying of land and other property for the public, as well as for roads and bridges for the county, but the latter work has been taken over by the County Engineer who is appointed by the Board of County Commissioners and acts as their consultant and assistant in planning bridge and road work. He serves as supervisor for any work being done by contract or on force ac-

count, such as the construction of bridges and culverts and other drainage work, where the law does not require the letting of a contract. The County Engineer must be a registered engineer of the state of Oklahoma. The law requires that if the County Surveyor is qualified he must be appointed County Engineer. The author has been in office for twenty-three years.

Post-War Outlook

The extent of post-war plans will depend upon the amount of finances. There is no question as to what and where the construction work will be, with many roads to be improved and the number of culverts and small bridges of temporary materials, small size, or poor design to be replaced. There are also a number of important farm-to-market roads which should be surfaced with gravel, shale or macadam, and oiled. The ten cities and towns of the county should have more and better farm-to-market roads radiating

(Concluded on page 27, Col. 3)

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For patch work. Operates same as automobile, slow forward and reverse speed, controlled by one hand lever. Both front and rear rolls can be filled with water. Easy to load on a truck for transportation from job to job.

Write for Bulletin 3810 N. Palmer St.



C. H. & E. Manufacturing Co.

Missouri, Mo.

MORE FORD TRUCKS ON THE ROAD • ON MORE JOBS • FOR MORE GOOD REASONS

TRUCK-ENGINEERED *Stamina!*



"... an Excellent Long-Term Investment"

THERE'S sound dollars-and-cents reasoning behind the selection of Ford Trucks by so many highway and airfield construction contractors.



Ford Truck sturdiness and reliability are facts which can be verified by merely asking any one of hundreds of fleet-owners. And the moderate cost of the Ford Truck, and of whatever replacement parts you may later require, commend these rugged vehicles to every operator who must keep his overhead aggressively competitive.

Mr. R. C. Larson, president of the Brookfield Company, of Astoria, Oregon,

one of whose Ford Trucks is pictured above, at work on Oregon's Nehalem Highway, sums up his experience in typical Ford fleet-owner style in a letter:

"We do not hesitate to recommend Ford Trucks as an excellent long-term investment. We have been using them since 1941, beginning with two. At the end of 1944 we were operating six truck mixers. They have proved very satisfactory during the four years we have operated them steadily."

Such performance has made Ford first choice of America's truck operators. Doesn't it strike you as ample reason for giving serious thought to new Fords for your fleet?

They're available now, in limited quantities, for essential civilian service. See your Ford Truck Dealer without delay.

FORD TRUCKS

AND COMMERCIAL CARS

TRUCK-ENGINEERED • TRUCK-BUILT • BY TRUCK MEN

Ford

FORD ADVANCED TRUCK ENGINEERING

More Economy • More Endurance
Easier Servicing

A STILL GREATER 100 HP V-8 ENGINE with NEW Ford steel-cored Silvaloy rod bearings, more enduring than ever in severe service • NEW aluminum alloy cam-ground pistons with 4 rings each, for oil economy • BIGGER, more efficient oil pump and IMPROVED rear bearing oil seal • NEW rust-proofed valve springs • NEW efficiency in cooling • in carburetion • in lubrication • Far-reaching ADVANCEMENTS in ease and economy of servicing operations.

IMPORTANT FORD CHASSIS ADVANTAGES: Easy accessibility for low-cost maintenance • Universal service facilities • Heavy-duty front axle • Extra-sturdy full-floating rear axle with pinion straddle-mounted on 3 large roller bearings • 3 axle ratios available • 2-speed axle available at extra cost • Powerful hydraulic brakes, exceptionally large cast drums • Long-lived needle bearing universal joints • Rugged 4-speed transmission with NEW internal reverse lock.



C. & E. M. Photo
The accumulation of dirt and grass pulled from roadside ditches in Tennessee is speedily loaded to trucks by an Athey Force-Feed Loader.

Equipment Cleans Roadside Ditches

The man-power shortage in the maintenance forces of highway departments is being relieved by the increased use of machinery to clean roadside ditches and to remove the excavated material from the roadway. In many departments this operation in the past was almost always done by hand labor. With the present lack of sufficient personnel in the maintenance crews to keep the ditches in shape, they have gradually filled with earth from the shoulders and slopes and become overgrown with vegetation. The purpose of the ditches to carry off drainage is thus nullified, resulting in damage to road base, pavement, and backslopes from the impounded storm water along and sometimes over the roadway.

Division 2 of the Tennessee Department of Highways meets this situation with a crew of 12 men and mechanized equipment which pulls from 3 to 5 miles of ditches on both sides of the road in a 10-hour day. This outfit began work about the middle of April along U. S. 64 between Winchester and Fayetteville, in the southern part of the state, where ditches had become practically nonexistent and grown over with alfalfa, honeysuckle, and Johnson grass.

The ditches are first reopened by a Galion grader drawn by an Allis-Chalmers HD-10 tractor, with the blade of the grader set at an angle so that the earth and vegetation are pulled from the ditch and piled along the shoulder in a windrow about 3 feet wide and from 1 to 2 feet high. This material is then picked up from the shoulder by an Athey Force-Feed Loader which moves over the windrow under its own power. The tips of the wing blades on the loader are 6 feet apart and flank the windrow on each side. These blades are set about 6 inches above the pavement so that the blade nearest the road will not scrape the surface, and red flags are mounted on the tips to warn passing traffic.

The dirt and grasses travel up a belt 30 inches wide and 32 feet long, and are dropped into 2-cubic-yard trucks backing against the loader. These trucks are filled to capacity within 45 seconds to one minute. On the work near Winchester, a fleet of five trucks, two Chevrolets and three Fords, hauled this

waste material about a mile on the average for use in widening the embankment on fill sections. The loader moves ahead against the direction of traffic so that the loaded trucks move with traffic when they pull away from the shoulder back onto the pavement. The crew cleans ditches for about 1/2 mile on one side of the road and then moves to the opposite side and does a like amount there. Final grading of the shoulders is done by an Austin-Western No. 10 grader towed by a Caterpillar Thirty tractor.

The 12-man crew consists of a foreman, a loader operator, a mechanic, 2 tractor operators, 2 grader operators, and 5 truck drivers. W. Rohen is Foreman and R. J. McCully, operator of the loader. These maintenance operations are in Division 2, of which S. M. Squires is Division Engineer and J. B. Ramsey is Division Maintenance Engineer. C. W. Phillips is Commissioner of the Tennessee Department of Highways and Public Works and W. T. Brooks is State Highway Engineer.

Topography Controls County Road Program

(Continued from page 25)

from them, which would approximate over 200 miles of construction.

From experience in construction of these roads under the Federal relief set-up, a rough estimate of the work that needs to be done would be about \$560,000 and more could be done if the money were available.

Today, almost any publication one picks up has news about the great developments that will take place after the war, developments in radio, aviation, home building, and hundreds of other facilities. A very large portion of the farm population knows, better than any engineer or writer can tell them, that rural-road improvement has always been far short of actual needs. More than half of the population lives where it is directly dependent, in a large part, on the local and feeder roads. The only way that local roads

can be brought up to a reasonable standard, justified by the traffic they carry, and by their general value in terms of serving the farm population, is by a county program which will insure progressive construction year after year.

In many counties roads have been wearing out far more rapidly than they are being built. Because of the shortage of man-power, material, and equipment during the war, highway construction has nearly stopped and present machinery in use is getting old and breaking down more frequently. In the post-war program there is a tremendous job to be done in meeting the demands of traffic on all classes of roads.

Tool Co. Branch Office

The Genesee Tool Co., Fenton, Mich., manufacturer of Tomahawk cutting tools, has established an office at 8855 Woodward Ave., Detroit 2, Mich. E. W. Keck, Service and Sales Engineer, is in charge.

Are You Bidding This Kind of Work?

ROAD MIX SURFACING
MIX-IN-PLACE ASPHALT BASE
SOIL CEMENT BASE
FLEXIBLE BASE
ANY TYPE OF STABILIZED BASE

If You Are, You Need a WOOD ROADMIXER

Here's why: (1) Your cost per square yard or cost per ton is less than when using any other method.

(2) It produces as much as 250 tons per hour of ready-to-spread mix.

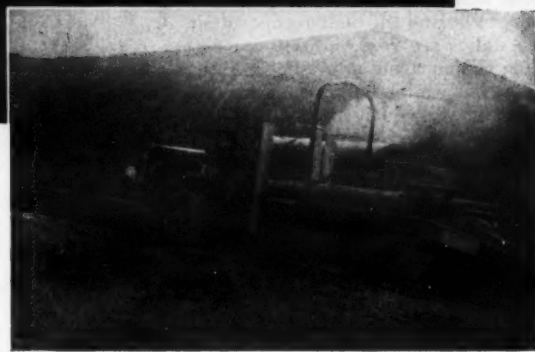
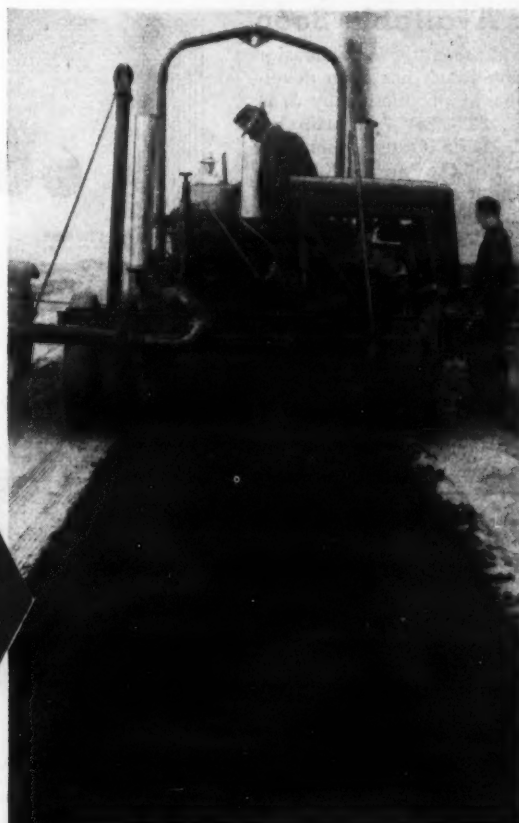
(3) It needs only a tractor and supply truck as auxiliary equipment, both of which can be used for other work when Roadmixer is not in use.

(4) Two men can handle average job.

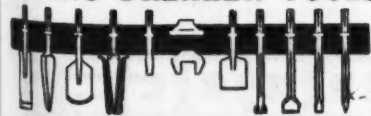
(5) It costs less to own, operate and maintain than any similar equipment on the market.

(6) It has a 12-year record of successful, economical, long-life construction throughout the world.

Wood' Roadmixers are now available without priority. See your nearest distributor or write direct for literature and prices.



"BICKNELL BETTER BUILT" PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

BICKNELL MANUFACTURING CO.

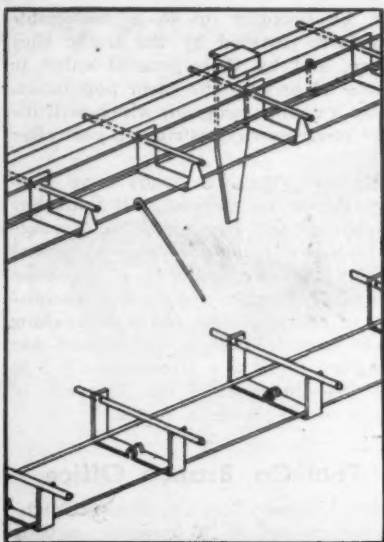
12 LIME STREET

ROCKLAND, MAINE

WOOD MANUFACTURING CO.

816 WEST FIFTH ST.

LOS ANGELES 13, CALIF.



The Jay Bee expansion (above) and contraction joint dowel assemblies have features of interest to designers of post-war pavements.

New Joint Assembly To Be Available Soon

A new dowel assembly for expansion and contraction joints has been developed for post-war production by J. B. Hunt & Sons, 323-325 W. Martin St., Raleigh, N. C. Already these assemblies have been used by the Navy in the Norfolk, Va., area, at an Army air base in South Carolina and another in Florida, by the North Carolina Highway and Public Works Commission, and by the Public Roads Administration on a test job in Arlington, Va. The various parts of the assembly are altered as to dimension in order to meet the requirements of the slab thickness and specifications as regards size, length, and spacing of dowels and height above the subgrade.

The Jay Bee assembly is a one-man unit which remains permanently in the pavement and consists of a series of dowel-bar supports of subgrade bearing plates of flat metal bent to support the dowels at the proper elevation above the subgrade. These supports are held in alignment by spacer bars of variable dimensions, the two bottom bars being spot-welded to the bases of the dowel-bar supports, while the single top spacer bar is immediately above the dowels and at right angles to them, holding the dowels in true position. Flat holding stakes are driven into the subgrade in front of the assembly and hold the expansion material and assembly in true alignment during the pouring operation. These stakes are removed without disturbing the concrete after the finishing machine has completed its operation. A bent metal stake driven into the subgrade and hooked over the back bottom spacer bar remains in the pavement and holds the entire assembly rigid during the placing and finishing of the concrete.

The dowel bar, of variable diameter and length, is inserted in a conventional dowel-bar sleeve to permit movement of the dowel during expansion and contraction of the concrete slab. The sleeve slips on the dowel while the dowel continues through the inner support and through the expansion-joint material, at the proper distance on the other side, into the adjoining slab.

The contraction-joint assembly is similar to the expansion joint except that the top spacer bar is omitted and the base of the dowel-bar support has an inverted U upset in it to permit expansion of the base when the slabs contract.

The job which the Public Roads Administration built at Arlington, Va., had an 8-inch slab 25 feet wide with the dowels 2 feet long spaced 12 inches on centers and located at the mid-depth of the slab. The inside dimension of the dowel support was 11 1/4 inches and the support was made of 14-gage material 1 1/2 inches wide. The dowels were 3/4-inch plain round.

A blueprint showing the features of the Jay Bee expansion and contraction-joint assemblies may be secured direct from the manufacturer by mentioning this descriptive text.

High-Early Strength To Speed Concreting

Concrete jobs can be speeded up, with a saving in time and cost, by the use of high-early-strength cement. Some idea of the wide variety of jobs in which Penn-Dixie high-early-strength cement has proved its value, together with a table of methods for mixing and curing concrete made with this cement for various temperature conditions, will be found in a 16-page bulletin on quick-use concrete, issued by Penn-Dixie Cement Corp., 60 E. 42nd St., New York 17, N. Y.

This and other booklets on standard and high-early-strength Penn-Dixie cement will be sent to those writing direct to the manufacturer and mentioning this news item.



Rounding the Curve of "Safety first" at Low Cost—**TUTHILL GUARDS**

CURVES, embankments, bridge approaches, grade crossings—all are made safe with the TUTHILL Guard. It combines high visibility, flexibility plus strength, low-cost installation, and economy of maintenance. Available for maintenance or installation. Request details.

Pacific Coast Manufacturers and Distributors: U. S. SPRING & BUMPER CO., Los Angeles, Calif.

TUTHILL SPRING COMPANY
762 W. POLK ST. CHICAGO 7 ILL.

“I’ll take **DODGE** over any of the rest . . . two to one”

says **JESSE G. WILFORD**
LAKE WALES, FLORIDA



“I’ve been driving trucks for thirty years, and I’ll take a DODGE over any of the rest . . . two to one. They use less gas and oil, and always run cool.” So says Jesse G. Wilford, driver for the Townsend Sash, Door & Lumber Company, Lake Wales, Florida.

Mr. Townsend writes: “We recently purchased two additional 2-ton Dodge trucks. All of our trucks are being used in logging operations, under very bad conditions.

“These Dodge trucks have proved entirely satisfactory, and it’s our opinion that the 2-ton Dodge is the ideal truck for logging, where tough and sturdy trucks are required.”

If YOU want this kind of dependable and economical service—let your Dodge dealer take care of your trucks! The “know how” of his mechanics, and readily available factory-engineered parts, will keep your trucks “on the job” without costly delays. Make your Dodge dealer your “truck headquarters!”

DODGE DIVISION of CHRYSLER CORPORATION



Your Dodge Dealer
NOW TAKING ORDERS!

Dodge is now building new 1/2, 1 1/2 and 2-ton Job-Rated trucks for civilian use. See your Dodge dealer NOW for the right Job-Rated truck to fit your job!

YOU’LL ENJOY “THE MUSIC OF MORTON GOULD,”
CBS, THURSDAYS, 9 P. M., E. W. T.

DODGE
Job-Rated
TRUCKS
FIT THE JOB . . . LAST LONGER

Coral Aggregate On Pacific Island

Seabees With Two Crusher Plants Speed Production of Calcareous Rock for Use In Runways and Roads

By R. P. DAY, CCM, USNR

(Photos on page 1)

OUT on a Pacific base several thousand miles from San Francisco, Seabees of the U. S. Navy have speeded up the construction of airfields and roads beyond all estimated hopes by combining good excavating technique with a pair of Universal 60-ton-per-hour rock-crushing plants. This plant set-up is perhaps a bit unusual because in this location the best available rock is a dense calcareous formation pushed up from the ocean floor in ages past. Because of embedded seashells, its coral history shows plainly. The rock has a loose cubic-foot weight of 94.7 pounds, and an apparent specific gravity of 2.59. Abrasion tests show that this rock has high wearing quality, and is therefore desirable for use in asphaltic-concrete aircraft runways.

The first Universal plant was brought in and set up while Marines were still flushing Jap snipers out of the hills. The plant was operating before the island had been officially declared secure.

Drilling and Blasting

While the plant was being set up, Seabees cleared away sparse growths of mangli bushes with machetes and started drilling and blasting operations. In many respects this was the hardest part of the job. The top of the coral-rock formation rose to a hog-back ridge, and all this had to be leveled for wagon drilling before rock could be shot loose on any great scale.

All preliminary drilling was done with jackhammers. A battery of seven LeRoi 315-cfm compressors was set up and an air line run up to the top of the ridge. As soon as this first work was done and the holes shot, a bulldozer was taken up on top and the ground leveled. Wagon drills with from 3 to 1½-inch-diameter bits were used with 18-foot steel to drill the second lift. Holes had to be drilled on 4-foot staggered centers and loaded with 16 sticks of 40 per cent Hercules and Atlas powder to obtain sufficient fracture so that the finished rock would pass through the primary crusher without trouble.

Some idea of the scope of this work is reflected in the case of the Seabee powder man on this job. He made his 100,000th blast since he left the States in 1943 on the day this job was visited.

Care of Equipment

When a Northwest Model 80 shovel



Coral rock is cleared away preparatory to the construction of an airstrip and ordnance ground on a Pacific Island.

was brought in to load material to the trucks which fed the crushing plant, a rather unusual problem arose due to the coral-like character of the rock. This rock has a tendency to pulverize under the action of a crusher to the extent that an unusual amount of fines is produced. Used in concrete aggregate, the finished material was found to be so well graded that the addition of sand was not necessary. The result of this

characteristic was a cloud of fine white rock dust that enveloped everything for 200 yards in each direction and settled down in machinery, sheaves, and bearings.

Particular care had to be given each machine in the matter of upkeep. Extra-heavy grease was used on Alemite and Zerk fittings. The shovel and both bulldozers had been rigged up with regular-lay preformed plow-steel ropes,

with the expectation that this job would be harder than usual. Here, however, the fine coral dust began to eat into the rope, causing too much wear. The Seabees then installed preformed Lang-lay rope, coated it with heated crater compound, and when the job was visited this hoist line had already given 714 hours of wear in the field.

The Crusher Set-Up

Not once since the Seabees started operating has the Universal plant failed to produce at capacity, and several times production has been pushed up to 100 tons an hour. A second plant arrived and was installed with the first plant about a month after the initial set-up.

Rock from the hill is hauled in 3-yard GMC dump trucks about 450 feet from the hill to the plant. It is dumped into the home-made feeding apparatus, consisting of a hopper with a sliding bottom driven by a Chrysler engine salvaged from an amphibious tank. It will

(Concluded on next page)



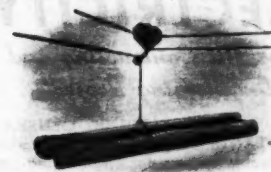
Wire rope toughness

means *Long* useful life!

Only by selecting wire rope of the proper strength and toughness can you secure true rope economy—long, useful life! For built-in strength and toughness give wire rope the reserve resistance which means greater rope efficiency.

Strength and toughness are put into wire rope when the steel is refined and processed. Here quality begins with the scientific blending of the proper ingredients in their correct proportion to produce the one wire rope best suited for *your* specific purpose.

Metallurgical research and control are *added* ingredients of every Wickwire Rope. This close watch over quality continues through the production of the correct alloy for use in each type, size and construction of wire rope, and then through each successive step of wire drawing and wire rope manufacture.



Thousands of wire rope users—old hands and new—have found our specially prepared manual, "Know Your Ropes" valuable in making their work easier and prolonging rope life. It contains 78 "right and wrong" pictures, 40 wire rope life savers, 20 diagrams, tables and charts. Send for your FREE COPY today.

USE RIGHT BUCKET FOR THE JOB



Hayward makes all three—clamshell, electric motor, orange peel. A Hayward recommendation is unbiased.



THE HAYWARD CO., 32-36 Day St., New York

Hayward Buckets



WICKWIRE SPENCER

Steel Company

500 FIFTH AVENUE, NEW YORK (18), N. Y.

ARLHNE • BOSTON • BUFFALO • CHATTANOOGA • CHICAGO • CLINTON (MASS.) • DETROIT • HOUSTON • LOS ANGELES • PHILADELPHIA • SAN FRANCISCO • TULSA • WORCESTER

Coral Aggregate

(Continued from preceding page)

take anything up to 16 inches in diameter. A Seabee feeds a stream of raw material into the crusher, keeping the flow constantly at capacity. From here the rock-crushing steps are as follows:

A slotted selector takes dirt and all minus 1-inch particles out. This material falls through to a conveyor belt where it goes out to a stockpile. (This discard has been used with exceptionally good results as road material, sub-base fill under asphalt pavement, and structural fill.) The rock then passes through a Universal 13 x 36-inch primary jaw crusher, with jaw clearances set at 5½ inches. Reduced in size, it then goes through a roll-type secondary crusher, set at 2-inch clearance, and falls on a 1 and 2-inch-mesh screen set in the shaker assembly. Material passing the 2-inch Symons shaker screen then goes into a Symons 1½-inch crusher and passes into the roll crusher. Material retained on the 1-inch screen goes directly to the secondary rolls.

A conveyor belt removes all finished rock to the stockpile. After the rock has passed through this process, it falls within this sieve analysis:

Screen Size	Per Cent Passing
¾-inch	99
¾-inch	52
No. 4	37
No. 10	23
No. 40	14
No. 60	12
No. 200	7½

Into Roads and Runways

Finished material in the stockpile is loaded out by a Barber-Greene loader to a fleet of dump trucks, which haul it to an asphalt plant operated by Army Engineers. When it leaves there, the asphalt has been mixed in and it is all ready to be processed into Grade A runways, parking aprons, and highways.

Not a small part of the credit for the speedy resumption of offensive operations against the Japanese belongs to

the Seabees who worked 10 and 12 hours a day 7 days a week getting this plant in shape. With both Universal plants now in operation, the daily average of material produced is 2,800 tons a day. Since this is being hauled away as fast as it can be produced, this 2,800 tons represents a very real picture of how construction has been speeded up because of the rock-crushing set-up.

War Surplus Abroad Will Aid Rehabilitation

The basic machinery for the disposal of war surpluses abroad was announced recently by the Surplus Property Board. It has been estimated that by the time the Pacific war ends, half of all government-owned surpluses may be located in foreign countries, in the war areas, in support areas, and in countries which have helped supply the war effort or have been on the routes of supply.

This vast mass of material and equip-

ment will be scattered all over the world, and no one can tell until well after V-J Day just what will be declared surplus or where or when, SPB said. In the recently issued Regulation No. 8, the Board has established the mechanism for foreign disposal, which will be aimed at achieving the following objectives:

1. To permit any surplus war goods to be channeled immediately into further usefulness in prosecuting the war. Equipment for which the Army or Navy has no further use might still help to build a road or improve a foreign port that would help speed victory.

2. To dispose of the rest that remains overseas so that it will play its part in building up U. S. export markets essential to full employment after the war.

3. To make the property available to other agencies to whom Congress has delegated the responsibility of helping to rebuild devastated areas or assist under-developed countries. This ties in with the second objective, since the recovery and expansion of other United

Nations is held to be essential in creating jobs and markets for Americans.

4. To obtain the best possible return for the property, whether it be in dollars or in other benefits to the nation as a whole.

To achieve these ends, the Surplus Property Board has set up a program which in effect creates a single disposal agent for all surpluses (except merchant ships) held abroad. This is the Army-Navy Liquidation Commissioner for overseas surplus and residue who, according to the regulation, receives broad powers of administration under the overall policy set by the Board.

Regulation 8 puts into effect the safeguards in the Surplus Property Act against unrestricted importation into this country of surplus property located abroad. There are two exceptions: importation on consignment to a person or firm in this country for the purpose of reconditioning for re-export, and importation by a member of the armed forces for personal use. U. S. firms are permitted to buy abroad for sale abroad.

TRUSCON

TRU-CURE

SPRAY IT ON

No paper—No burlap

Produces better concrete



One-Man operated
Tru-Cure Multiple-
Nozzle Applicator.
(Patented)

ONE MAN CURING

Continuous Operation—Right Behind the Finisher

Since extended research has proved the astounding effectiveness for moisture-retention of Truscon Tru-cure type of curing film—it now becomes a matter of applying that curing film over large concrete areas in such a manner that there will be no breaks or leaks in the film's continuity.

For that purpose, the one-man-operated, TRU-CURE Multiple-Nozzle Applicator shown above was designed and built by Truscon concrete engineers.

Scientific tests have proved this to be the fast, time-saving and dependable method of applying the transparent, water-retaining concrete curing compound to a uniform thickness. It lays a protective film over all the concrete surface—no "skips" or thin spots.

This convenient, efficient, one-man applicator is one of Truscon's contributions to "better concrete." Properly cured concrete is better concrete.

These TRU-CURE Machines have helped make possible the nation's tremendous airport and military roadway expansion. Machines are available, either through the sales agencies of the Truscon Laboratories, or are built by machinery dealers for road contractors. Blue prints and specifications may be had, no charge, by communicating with address below, or any Truscon Laboratories' office.

TRUSCON

LABORATORIES Inc.

DETROIT MICHIGAN



TRUSCON TRU-CURE

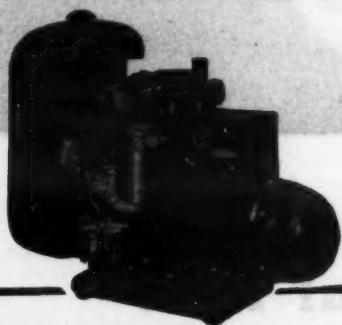
Used on millions of square feet of concrete—Truscon Tru-Cure met the war emergency for more roads, and better roads, rapidly constructed. It has proved to be the most successful method of curing large concrete areas—factory floors, roof slabs, highways, airport runways.

Tru-Cure curing follows right behind the finisher—no time lost—makes possible water retention during that early critical period where lack of curing causes hair checks and shrinkage cracks in concrete.

Equivalent to 14-day water curing—no burlap—no paper—no worry about keeping concrete wet—no cleaning up afterwards.

Truscon Tru-Cure is a clear liquid—requires no removal, as film weathers off in a short time. Approved by United States Army Engineers and numerous State Highway Departments.

Ask for descriptive literature.



ELECTRICITY

For All Contracting and Engineering Projects

* ONAN ELECTRIC GENERATING PLANTS supply reliable, economical electric service for engineering and contracting uses as well as for scores of other general applications.

Driven by Onan-built, 4-cycle gasoline engines, these power units are of single-unit, compact design and sturdy construction. Suitable for mobile, stationary or emergency service.

Models range from 350 to 35,000 watts. A. C. types from 115 to 660 volts; 50, 60, 180 cycles, single or three-phase; 400, 500, and 800-cycle, single-phase; also special frequencies. D. C. types range from 6 to 4000 volts. Dual voltage types available. Write for engineering assistance or detailed literature.

D. W. ONAN & SONS

1247 Royalston Ave.
Minneapolis 5, Minn.



A Handy, Fast Crane For Yard Operations

A new folder, No. 2071, has recently been issued by Link-Belt Speeder Corp., 301 W. Pershing Road, Chicago 9, Ill., on its Model YC Cargocrane designed for fast loading, unloading, and stacking of materials in highway department and contractors' yards. It is also adaptable to storehouse and plant

operations because of its power, mobility, and easy operation. It will lift 2,900 pounds at a 15-foot radius and up to 15,000 pounds at a 3½-foot radius. The boom swings a full 210 degrees and, with the short turning radius of the Cargocrane, this means ability to work fast in narrow spaces. The swing mechanism and steering are hydraulically operated.

A copy of Folder 2071 describing the

Cargocrane may be secured direct from the manufacturer by mentioning this review.

New Worthington Dealers

The Worthington Pump & Machinery Corp., Harrison, N. J., has announced the appointment of the following distributors for its line of construction equipment: Clark-Wilcox Co., 118-124

Western Ave., Allston, Boston, Mass.; Maine Truck-Tractor Co., 158 Veranda St., Portland 3, Maine; The Howard Corp., 27 S. Meramec, Clayton, Mo.; A. M. Flanders, Inc., 411 N. Main St., Barre, Vt.; Milton-Hale Machinery Co., P. O. Box 8, 1024 N. Broadway, Albany, N.Y.; Landes Engineering Co., 171 W. S. Temple, Salt Lake City, Utah; and the Coast Equipment Co., 948 Bryant St., San Francisco 1, Calif.



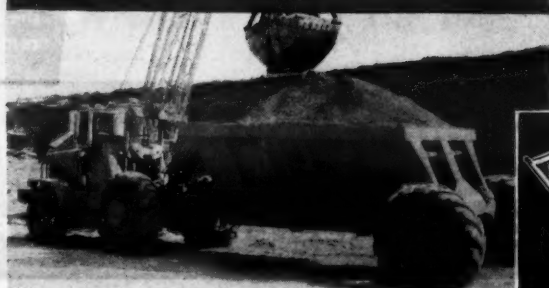
For full and positive full visibility... smooth performance... easy adjustment... minimum maintenance... loaded on...

HEIL *"engine mounted"* CABLE DOZERS



Heil Hi-Speed Cable Dozers give you fast, profitable dirt-moving at low cost.

Heil Hi-Speed Bottom Dump Wagon saves loading time — cuts hauling time — speeds dumping.



This cable-operated, "engine-frame mounted" Cable Dozer has the lifting mechanism mounted on the tractor engine frame to provide a direct overhead lifting operation. Designed through close cooperation with the International Harvester Co. engineering staff, it provides a perfectly balanced team that works as an integral unit.

The raising and lowering action of this unit is faster and easier to control for accurate blade setting. You get a higher lift of the blade which is particularly important in tree dozing, plus a drop that is practically unlimited. With Heil Cable Control there is instant response to movements of the control lever which enables the operator to inch the blade up or down, or to raise it rapidly for pitching action.

Heil design assures you of full benefit of all the power furnished by the tractor — more driving and penetrating power at the blade, and more "pay dirt" moved with each load. For full details and specifications —

R-51

Write for descriptive bulletin.



THE HEIL CO.

GENERAL OFFICES

MILWAUKEE 1, WISCONSIN

River Channel Dredged For Stretch of 11 Miles

(Continued from page 6)

Martinsville will be raised 3 feet. While Bayou Teche itself dwindles away and extends no further north than Port Barre, it does have a connection with Bayou Courtableau which has a water shed reaching northwesterly to Alexandria. Some of this water can be sent down the Vermilion where it can be used for irrigation instead of following its usual course to Morgan City and the Gulf via the Atchafalaya River.

The topographical surveys for the combined Vermilion River projects were based on a set of aerial photographs taken by the Crop Control Division of the U. S. Department of Agriculture. Field surveys were later run and tied in to the aerial mapping.

Spoil Areas and Clearing

The land in the low-lying Gulf coastal plain is remarkably fertile and naturally of great value. Consequently material dredged from the Vermilion could not be indiscriminately wasted along the banks over a wide area of crop land, but had to be restricted to definite spoil areas bordering the river. Dikes were constructed along the bank by clamshell dredge and the dredged material from the river deposited behind them. By taking the material from the river channel, less hydraulic dredging was necessary and the dikes prevented any of the dredged material from running back into the river.

Widening was done on either or both sides, depending on the topography of the river banks and the effort to straighten the channel. If the river had a high bank on one side and bottom lands on the other, widening was usually done on the latter side, although there was no absolute rule for the choice of sides. For widening on both sides, a right-of-way width of from 350 to 400 feet was necessary, while in sections where the river was widened on but one side right-of-way acquisition of about 200 feet back from the original bank was usually sufficient. Right-of-ways for both the channel and spoil disposal areas were furnished by local interests.

The right-of-way area along the banks was cleared by a crew of twenty men using ditch-bank blades, a long, sharp blade fastened to a 6-foot handle, for cutting through the thick vines and underbrush. Small trees, under 6 inches, were usually felled with an axe, while the larger variety were cut down with a two-man gasoline-driven cross-cut saw and snaked away by tractor; two D4 Caterpillars were used in the clearing operations. The clearing crew worked 2 to 3 miles ahead of the dredging and were quartered and fed on a quarter boat anchored nearby in the river. Local farmers were glad to get the trees for use as firewood.

Clamshell Dredging

When this project was started in October, 1944, the clamshell dredge Louisiana, owned by the McWilliams Dredging Co., was used to build the bank dikes along the river. Early in

January, 1945, this dredge was acquired by the U. S. Navy and the clamshell dredge Illinois picked up where the Louisiana left off. The Illinois was formerly part of the McWilliams fleet but had been sold last year to the Lionel Grizzaffi Towing & Dredging Co. of Morgan City, La. The dike construction performed by the Grizzaffi-owned Illinois was on the basis of a subcontract from McWilliams, the prime contractor.

Dredging started 2.35 miles north of Abbeville with the clamshell dredge making a cut 50 feet wide, and about 5 feet deep, along the bank or banks to be improved. Berms, or flat sections, 50 feet wide were left along both banks, and the dikes to retain the pumped material were built far enough back from the berms so that the 1 on 4 slope of the river side of the dike would not

encroach on the berm itself. These dikes or spoil banks had a maximum height of 15 feet above the toe and tapered down to the level of the bank when the cut for the channel switched to the other side of the river.

The dredge advanced up the middle of this 50-foot cut, digging its own channel as it went. With a 3½-yard Williams clamshell bucket on its 135-foot boom, the dredge Illinois easily cleared the 50-foot berm and deposited the material directly to the location of the dike with no further handling. Roots and stumps yielded easily in the soft earth, and were picked up by the bucket and dropped on the land side of the dike. The Illinois, which measures 118 x 45 x 7 feet, moved ahead by using its bucket as an anchor, sinking it into the ground at the end of the boom and then reeling in the tagline. In this manner the clamshell dredge kept athwart the cut, and constructed the dikes quickly and efficiently, never holding up the hydraulic dredge following behind.

Hydraulic Dredging

A mile or two behind the dike construction came the diesel dredge Vicksburg pumping a silty clay mixed with a little sand through its 20-inch discharge pipe out to the spoil areas on the land side of the dikes. This dredge cut a channel 100 feet wide at the bottom grade of minus 9 feet mean low Gulf datum, with a 1-foot allowable over-depth to 10 feet, and 1 on 2 side slopes. The discharge from the dredge was carried in a floating pontoon line to a spill barge with 110 feet of pipe long enough for deposition of the hydraulic fill behind the spoil banks and obviating the need for a cumbersome shore line.

Many of the small land owners whose property abutted the spoil areas behind the dikes had no objection to the hydraulic fill spilling over on some of their acres not in cultivation, so great is the fertility of this river-bottom soil. These French-speaking Cajun farmers, descendants of the exiled Acadians, often requested the contractor to divert

(Concluded on next page)



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Channel Is Dredged For 11-Mile Stretch

(Continued from preceding page)

some of the flow of the pipe line onto their land to make their fertile soil even more fruitful. After the dredged material settles for a year or two, it will be ready for cultivation.

Spill Barge

The use of a spill barge enabled the contractor to work with a floating pontoon line that seldom exceeded 850 feet in length and was usually much shorter. A 15-foot length of pipe with double ball joints at each end was used to connect the pontoon line with the spill barge which measures 80 x 32 x 8 feet and has a 40-foot A-frame with a capacity of 50 tons. The A-frame supported 110 feet of overhanging discharge pipe, reinforced by a beam welded along the top, which was 20 feet higher than the water level at the out-flow end. Two 25-foot booms at the bow of the spill barge had anchor connections to the shore to keep the barge in place while working. The A-frame and the booms can be moved by a dual-drum CMC winch. A Y-connection on the deck of the barge permitted its use on either side of the river with no lengthy shifting of pipe. The discharge end can be given an additional lift when necessary by pumping water into the stern of the barge, thereby raising the bow.

The spill barge not only saved the labor that would have had to be used with a shore line but also placed the material well behind the spoil banks so that it did not run back into the river before settling. When the dredge moved, the anchors on the spill barge were raised and the entire unit was slowly yet easily towed along by the dredge. When pipe lengths were added or removed from the pontoon line, the break was made along the middle of the line between the dredge and the spill barge.

Shifting of Dredges

As mentioned previously, the clam-shell dredge Illinois replaced the clam-shell dredge Louisiana which was requisitioned by the U. S. Navy. In order to bring the Louisiana up the Vermilion River and through the vertical-lift bridge at Abbeville, the McWilliams Co. found it necessary to lower the A-frame on the dredge, an operation which takes about 10 days and costs around \$5,000 to \$6,000 for labor. To save time on the way out, it was decided to attempt to pass the Louisiana under the bridge at low tide without lowering the A-frame. The Abbeville bridge has a clear horizontal span of 75 feet which is reduced to an actual clearance of 50 feet by two rows of pile bents driven in front of the abutments for protection. When the vertical lift is raised an overhead clearance of 60.7 feet above mean low Gulf level is provided.

On Monday night, January 15, the Louisiana was weighted down with water ballast to bring the hull low in the water so that the A-frame, which

towers 60 feet above water level, would surely pass under the raised span. Just north of the bridge the river bends to the west so that it was difficult to direct the Louisiana, which is 120 feet long x 50 feet wide x 7 feet deep, through the opened bridge at right angles to the span. The passage was attempted stern first but the combination of the weighted hull and the bend in the river ran the bow aground and forced the starboard stern corner of the dredge against the protecting timber bents along the east abutment.

The dredge ran aground at 7 p.m. and strongly resisted all efforts to move her. Two deadmen were buried in the bank on each side of the river below the bridge, and cables from these were attached to the winches of the dredge in an attempt to pull the Louisiana through the span. North of the bridge the clamshell bucket on the end of the boom was used as an anchor in an attempt to loosen the grip of the river bottom in that direction. Unfortunately this spot was the location for a 6-inch

cast-iron pipe water main, which was laid across the bed of the river in a 6-foot trench only last year to provide residents of the western section of Abbeville with water pumped from the wells on the eastern side where the main part of the town is located. The thrashing around of the heavy bucket broke the water main, depriving the residents on the west bank of water.

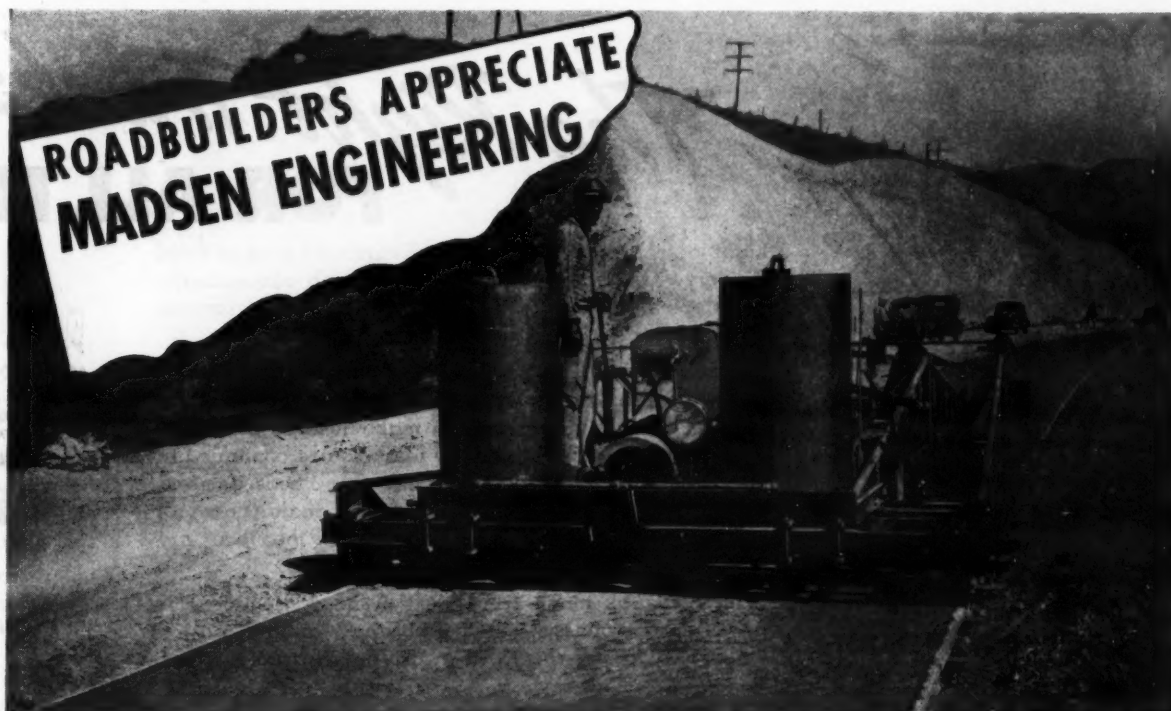
In a struggle which lasted until 3 o'clock the next morning, the combined efforts of the rising tide, and the north and south movements of the dredge on the anchored cables and bucket finally freed the Louisiana from its position across the bridge span. The dredge went through the bridge to the south, the raised span was lowered, and auto traffic was resumed across the Vermilion. A fire hose was run across the bridge to supply water to the community on the west bank, pending repairs to the water main. Despite the delay and the damage caused to the bridge piling and the water main, the cost of repairs was estimated to be consider-

ably below the cost of lowering the A-frame.

Personnel

This combined navigation, flood-control, and irrigation project for dredging 2,350,000 cubic yards on 11 miles of the Vermilion River in Louisiana started in October, 1944, and was finished by June, 1945, at an approximate cost of \$280,000. The work was done under the direction of the New Orleans District, U. S. Engineer Department, of which Colonel George H. Hudson, Corps of Engineers, is District Engineer. Major A. H. McRae is Executive Officer, and Walter C. Carey is Chief of the Inspection Division of the District. Resident Engineer on the project was Noy O. Lewis, with headquarters at Abbeville.

For the McWilliams Dredging Co. of New Orleans, Captain L. C. Gibbs was General Superintendent, while Lionel Grizzaffi himself directed the dredging operations of the Grizzaffi Towing & Dredging Co. of Morgan City and New Orleans.



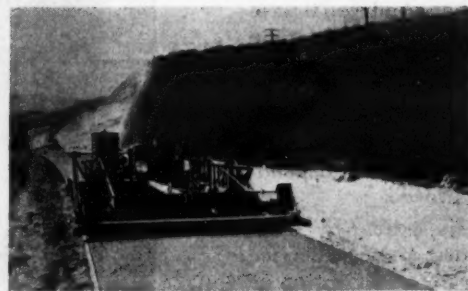
JOHNSON Mechanical FLOAT FINISHER ...BUILT BY MADSEN

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aggregate and brings the liquid mortar to the surface. Adjustable floats spread, fill and smooth the entire surface of the concrete. The Johnson Float Finishers' process eliminates unevenness and severe slump; it produces a uniform surface that gives a final finish ready for edging and jointing.

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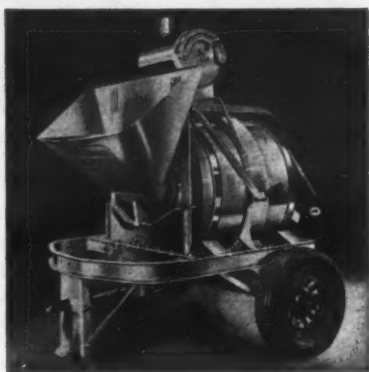
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Improved Design Is Feature of Mixers

One of a line of improved concrete, plaster and mortar mixers which has been announced by the Jaeger Machine Co., 701 Dublin Ave., Columbus 16, Ohio, is the 3½-S Auto-Loader. It is equipped with a measuring hopper which automatically shakes its charge into the drum when the gate is opened. This hopper, with its low front and high back, has the same capacity as the mixer drum, thus serving to measure the batch.

The hopper can be loaded while the previous batch is being mixed and discharged. A pull of the lever which opens the hopper gate automatically starts the power vibration which shoots the load into and across the drum in a swift slide without need for pounding the hopper front. The action is identical with that used on 1 and 2-cubic-yard Jaeger mixers built for commercial concrete plants, and is said to increase the average daily yardage of the ma-



The hopper for measuring and automatically charging the drum is a feature of the Jaeger Auto-Loader.

chine by 15 to 20 batches. Drum tracks of machined high-carbon steel of the type also used in the largest mixers, and interchangeable steel or pneumatic-tired wheels using the same Timken-bearing hubs, are standard features.

A new catalog, describing the Auto-Loader and larger 1945-model Jaeger

trailer mixers of 6-S, 11-S, and 16-S capacities, as well as non-tilt plaster-mortar mixers of the latest "frameless" construction, may be secured direct from the manufacturer.

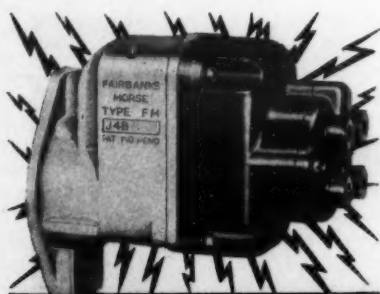
A Six-Year Program For Post-War Roads

Six years ago in Sangamon County, Ill., a comprehensive plan was developed to give the greatest service to the county with the least possible road mileage and the lowest overall costs. Since that plan was developed, reports Ray V. Tilly, Superintendent, Sangamon County Highway Department, Springfield, Ill., all roads constructed by the County have been built according to the plan. Now a post-war county road-building program has been completed necessitating the expenditure of more than \$2,000,000 in developing the system which still requires 62 miles of new roads in new locations, to cost \$337,000, and 21 new bridges to cost

\$937,000.

In addition to this, there are 57 miles of roads which Mr. Tilly reports should be reconstructed at a cost of \$544,000 to meet the demands of modern traffic. It is also considered advisable to improve the grades and drainage on 20 miles of existing roads, at a cost of \$98,000.

This makes the overall cost of improving the county highway system, so that it will give service to all parts of the county and better service to those parts which are now served by county highways, a total of \$2,216,000. These improvements would be made without Federal assistance. When Federal assistance does become available, the equivalent of the funds received from that source will be used to construct more modern and more substantial surfaces on the more important roads of the county highway system. Issuance of \$1,900,000 in road bonds to supplement current county funds is included in the plan for financing the proposed improvements.



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LIGHT DELIVERY PICK-UP TRUCK, 115-inch wheelbase—90-

horsepower engine—3-speed Syncro-Mesh transmission—hydraulic shock absorbers, front and rear—all-steel cab—unit-designed body.

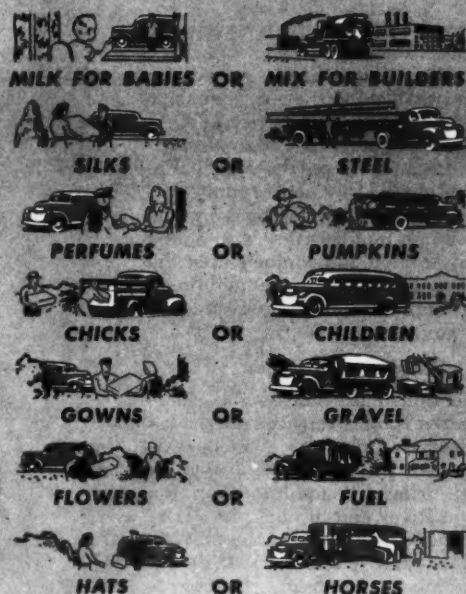
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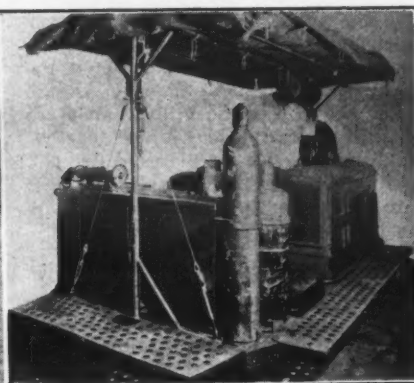
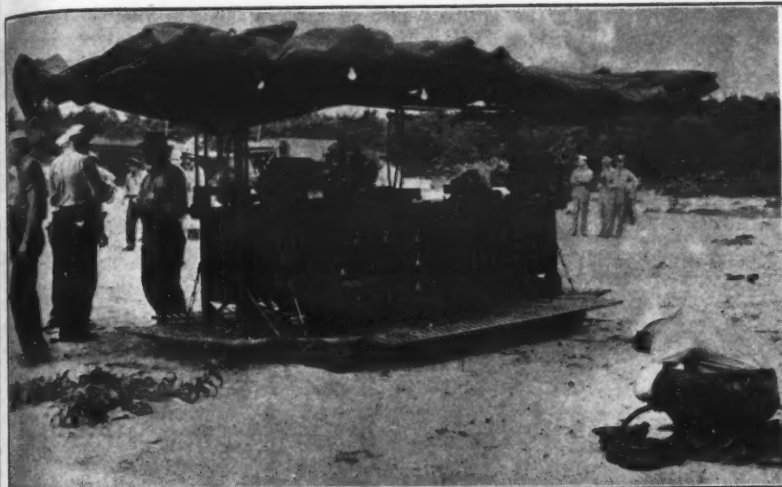
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Salvage of damaged equipment on an invasion beachhead is carried on with Unitized Repair Bases made up of several skid-mounted shops. At left, the machine shop; above, the hull repair shop.

Equipment Repairs By Beachhead Units

**Navy Devised Skid-Mounted "Shops"
To Salvage Equipment Damaged in
Amphibious Operations**

THE two major factors making for success in amphibious operations are surprise and speed. The surprise may be sprung, the enemy caught flat-footed, but if the beachhead becomes littered with damaged equipment, the initial momentum is lost and heavy casualties are inevitable. In an effort to cope with this problem of putting vital equipment back into battle rather than have it pile up on the beaches as junk, the Bureau of Ships in cooperation with the Philadelphia Navy Yard devised the Unitized Repair Base now being assembled at the Thornton-Fuller Co. plants in Philadelphia.

A complete Unitized Repair Base consists of seven separate skids or sleds, each having a particular type of equipment for the immediate repair of damaged machines and supplies of the Army and Navy. There are a machine shop, hull repair shop, engine and transmission repair shop, utilities shop, spare parts shop, consumables shop, and retriever. The several shops are mounted on welded skid bases or pallets, each measuring 11 feet 10½ inches x 6 feet x 6 inches, reinforced by five transverse 4 x 4-inch box girders and two longitudinal 6 x 6-inch skids. These repair bases fit into the well of an LVT (landing vehicle, tracked), sometimes called the amphibious tractor, so that when the landing ramp is lowered they can be dragged out and onto the beach. Hinged extensions on all four sides of the skid provide additional floor space, while a waterproof canvas spread over a steel pipe frame welded to the pallet forms the roof. The ends of the vertical stanchions of the framework are flattened and pierced to serve as lifting eyes when a boom lift is necessary.

The Shop Equipment

The hull repair shop, as the name implies, is to repair and salvage knocked-out landing and supply ships of the Navy and is largely a portable power operating shop. Major equipment for this skid includes a Hobart gasoline-engine-driven 300-ampere 40-volt elec-

tric arc welder, a gasoline-engine-driven air compressor with a 5-kw generator as a source of auxiliary power, and a portable oil-burning blacksmith's forge and anvil mounted on a portable block. This equipment is

supplemented by a complete oxy-acetylene cutting and welding outfit, including tools, welding cable, hoods, gloves, attachments, etc., and such tools essential to carrying on normal repairs on the hull or track elements of the LVT's

as pneumatic chipping and scaling hammers, heavy files, pliers, drills, grinders, and other hand tools. As in the case of the machine shop, the sled is laid out to do a complete job, but does not operate alone, as the heavy load of accessory equipment and consumable supplies necessary to its operation are carried in the spare parts shop and consumables shop.

To salvage entire LVT's or their parts when they cannot be brought up to the landed shops under their own power, the retriever unit is brought into use. This unit must be able to salvage under all conditions, ashore or afloat, and is so designed. Its operating power is provided by a standard jeep engine and transmission through special drive adaptations, and its equipment includes a winch, a salvage pump, and a 200-ampere electric arc welder. The winch carries 300 feet of ½-inch wire cable. Operating over the A-frame boom, it can readily effect a lift of 1,500 pounds, while on a straight pull, without the

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Equipment Repairs By Beachhead Units

(Continued from preceding page)

boom, a towing capacity of 20,000 pounds can be achieved. Its fire-fighting equipment includes a 500-gpm pump, four 15-pound carbon-dioxide extinguishers with fog nozzles attached, and supplementary accessories.

The retriever's arc welder is complete with underwater cutting equipment, as this is used by a member of the crew outfitted in shallow-water diving gear. By this means, engines and other vital parts can be cut loose and salvaged from sunken craft, or such craft can be temporarily repaired for floating and towing to the beach shops. While the retriever conducts such operations afloat, it is made stationary by four Danforth anchors.

The utilities shop carries a radio transmitting and receiving set which makes it possible to maintain constant communication, not only with the com-

bat units, but also with the retriever scouring the beachhead for such equipment as has become stalled, often as the result of only slight damage. In the galley cabinet of the utilities shop are carried combat field rations, together with two electric hot plates, coffee pot, and other utensils. In addition, there are rubber ponchos, mosquito nets, and bedding for the crew of twenty men.

Doing an Important Job

After the Unitized Repair Base's successful tests on the Delaware River shore, Admiral Edward L. Cochrane, Chief of the Navy's Bureau of Ships, said:

"Their job is to serve the amphibious forces at the height of the battle when speedy repairs are most essential and before there has been time to set up any of the permanent repair bases. They have been designed by the Bureau of Ships so that the entire cost is slightly more than that of one amphibious tractor. Thus, when the first LVT, which would otherwise be lost, is

rescued and repaired, the entire base has practically paid for itself."

Wood Names Gen. Mgr.

DeWitt Page has been appointed General Manager of the Wood Mfg. Co., Los Angeles, Calif., manufacturer of Wood Roadmixers. In his new posi-

tion, Mr. Page, who has been with the company since 1937, will not only supervise design and manufacturing procedures but also will direct sales policies affecting thirty-three Wood distributors throughout the country.

Mr. Page's appointment is in line with the company's plans for post-war manufacturing and sales expansion.

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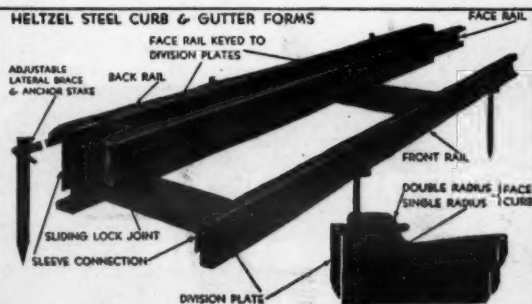
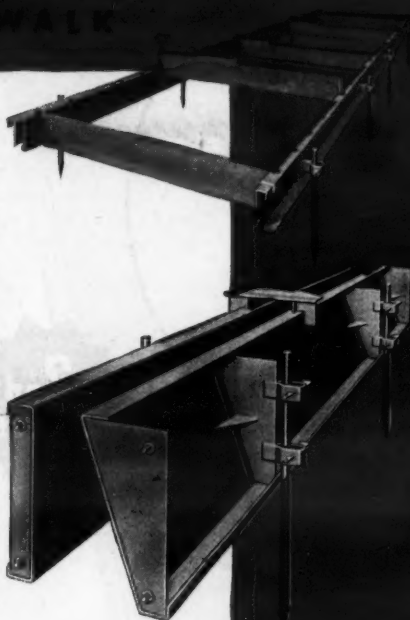
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A Shot in the Arm For Mass. Highways

Legislative Committee Makes Comprehensive Report on Highway Needs, Diversion, And Land Acquisition

CIVIC organizations and the press throughout Massachusetts concur with engineers that the initial report of the Post-War Highway Commission has done much to improve the highway situation in the Bay State. This Commission, a special unpaid body consisting of two State Senators appointed by the President of the Senate, five Representatives appointed by the Speaker of the House of Representatives, one member appointed by the Governor, one member appointed by the Mayor of Boston, the Commissioner of the State Department of Public Works, and the Chairman of the Metropolitan District Commission, was created by the Legislature by Chapter 46, Resolves of 1943. It was to serve until November 1, 1944, but its life was extended for the period of the present legislative session and it is probable that it will be extended for another two years.

The Commission's State Legislature members include Senator Harris S. Richardson of Winchester, as Chairman; Senator Leo J. Sullivan of Boston; Representative Edward W. Staves of Southbridge, as Vice Chairman; F. Eben Brown of Fairhaven as Clerk; Representative Peter J. Jordan of Revere; Representative Michael J. Neville of Cambridge; and Representative Philip M. Markley of Springfield. The Governor appointed William A. Bennett, Mayor of Worcester; the Mayor of Boston appointed Charles A. Coyle of Boston; and Commissioner Herman A. MacDonald of the Department of Public Works, and Commissioner Eugene C. Hultman, Chairman of the Metropolitan District Commission, were named under the terms of the resolve. At its organization meeting, Philip H. Kitfield, Assistant Project Engineer of the Massachusetts Department of Public Works, was named as Engineer-Advisor.

The Commission has worked in close cooperation with the Department of Public Works and other state bodies, as well as with groups of engineers, to formulate its report. The purpose of the Commission is to make a study of such highway projects throughout the commonwealth as may, in its opinion, be necessary or advisable to be carried out after the termination of the present war, with a view to recommending a post-war program of highway and traffic improvements. The Commission, in carrying out its studies, was instructed to "consider, with respect to each highway project which it may deem necessary or advisable for inclusion in such a program, as to whether public convenience requires the construction or carrying out thereof, and if so, it shall determine as to said project (1) the probable cost; (2) how the cost of said improvement, and of land takings, if necessary, therefor, should be apportioned; (3) by whom said improvement should be made; and (4) by whom said improvement should be maintained upon its completion."

A joint survey by the Commission, the Massachusetts Department of Public Works, and the State Planning Board was immediately undertaken, starting in September, 1943, for the purpose of planning a state-wide highway program. The result of this survey plainly indicates that if Massachusetts is to have a well coordinated highway network to meet anticipated after-the-war traffic requirements, many changes in existing highways, and construction of new highways in many parts of the

state, are not only desirable but an urgent necessity. Opinions on priority and cost differ, but all members agree that the needs are so urgent that drastic changes in the present method of state highway financing are needed.

Observations

A diagnosis of the contributing causes for the present deficiencies in the Massachusetts highway system, according to the report, reveals the following fundamental weaknesses: (1) lack of planned financing; (2) limiting construction appropriations to grudging last-minute matching of Federal funds allocated by a Congress totally unfamiliar and equally indifferent to the state needs; (3) depleting the Highway Fund of its revenue for other than highway

purposes.

Previous to the existence of this Commission, there has been no state highway plan, for the very good reason that no appropriation has ever been authorized for such a plan. The State Department of Public Works was well aware of the highway needs, but could not plan intelligently because of the uncertainty and unpredictability of future appropriations.

Diversion

The Commission reports that the Federal government takes from motorists of Massachusetts over \$8,000,000 per year, and the Legislature is distributing an average of another \$8,000,000 per year to cities and towns, not necessarily for highway purposes. Since 1933 there has been diverted from the State Highway Fund for other purposes by the Legislature the sum of \$109,000,000. The distribution to cities and towns is ostensibly for highway purposes, but it produces no highway improvements. It is actually disbursed on a basis of

wealth, without needs or expenditures being considered.

The first diversion was authorized in 1933 to reduce the state tax levy on cities and towns. This was purely a relief measure to help improve their finances, so depleted during the depression. No attempt was made to authorize its use for highway purposes so that it became a straight transfer of \$8,000,000 to the General Fund. It was justified on the grounds of an extraordinary economic emergency. Once the precedent was established, there was no stopping the practice, and in the four succeeding years a total of \$30,000,000 was transferred to the General Fund.

In 1938 this practice became embarrassing to the politicians, so an old practice by a new name was introduced. The practice was continued, but a new title was adopted, "Distribution to Cities and Towns for Highway Purposes". From then to 1945 inclusive, another \$58,000,000 was extracted from the Highway Fund. The title had changed but the

(Continued on next page)

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A Shot in the Arm For Mass. Highways

(Continued from preceding page)

disposition of the funds remained the same. The Commission states, "We submit that the present poor and inadequate condition of our highway system is due to this diversion. We are convinced that our highways are in such desperate need of improvements and new construction that the entire Highway Fund will be required to meet the demands for at least ten years. We are faced with the possibility of a serious and costly disintegration of the highway system in which the State and the municipalities have such a large investment."

With the \$8,000,000 that has been diverted by the State, there might have been constructed each year at least 26 miles of modern divided express highway, or approximately 100 miles of modern paved two-lane highway, or 500 miles of rural roads.

Condition of State Highways

According to the report, the state highway system of Massachusetts is obsolete and worn out. The condition of the highways in the spring of 1945 after the exceptionally hard winter emphasized this fact, but it has been apparent every spring. Intensive maintenance put these roads back into reasonably satisfactory condition before the summer season but it is obviously unsound to continue year after year these heavy annual expenses on worn-out highways without permanent improvement.

The Massachusetts state highway system includes about 2,000 miles. It is generally agreed that the life of a pavement is at most between 20 and 30 years. Even taking the higher figure, it would be necessary to reconstruct at least 70 miles of state highways per year to retain even this mileage, but it has been many years since any such mileage has been reconstructed in any one year. Of the present state highway system, approximately 563 miles or 28 per cent of the pavements are over 20 years old and approximately 118 miles or 6 per cent are over 30 years old.

Studies and Recommendations

For the purpose of expediency and concentration of engineering effort, it was deemed advisable to organize two groups of engineers, one to handle state-wide highway problems, with the exception of greater Boston, and the other group to handle the greater Boston problem. In defining the greater Boston area referred to as the Metropolitan District, a distance of approximately 10 miles from the hub of Boston is taken in all directions. When the two groups of engineers were organized, they were given the responsibility of furnishing the Commission with traffic data, reconnaissance, diagnosis of locations, recommendations as to type of structures, estimated costs, etc.

Reconnaissance studies are being made on projects in all sections of the state with the cooperation of the State Department of Public Works in spite of its shortage of engineers. For several years, its engineers had worked at odd times on many desirable projects and had plans developed in various stages. Many of these partly finished plans were approved and the Commission ordered that they be immediately completed so that, in the event of an unemployment crisis, plans would be available to proceed with construction and furnish employment. The sole reason for this action was expediency and no priority was intended.

In the first group of projects on which plans, blueprints, and specifications have been completed there are 54 proj-

ects totaling 78.1 miles and estimated to cost \$14,029,000. These projects include the reconstruction of existing state highways as well as new locations, grade-crossing elimination, the construction of bridges over railroads and rivers, by-pass construction, the building of traffic circles, and the construction of an access road to an airport and to a hospital.

In addition, another group of major route improvements involving 454 miles of construction at an estimated cost of about \$130,000,000 is being studied but has not yet been approved. This involves 22 projects. The addition of 52 highway projects covering about the same field as previously mentioned is to be considered shortly. These involve a total length of about 160 miles at an estimated cost of about \$30,000,000. Even they do not include all of the state highway reconstruction needed, being only the more urgent projects.

Advance Land Takings

The state-wide Engineers Commit-

tee believes that a program of land takings for post-war highway projects should be started at once, without waiting for the end of the war. This is one of the phases of the post-war program that can be accomplished now without the use of critical materials or labor and with a probable ultimate saving to the State.

As conditions stand today, the detailed and complete plans for post-war highways are being prepared. These plans are expensive, as the average cost of surveys, plans, estimates, and designs for a project is about 4 per cent of the cost of construction. In other words, the completed plans for a project to cost about \$1,000,000 will cost in the vicinity of \$40,000.

These plans are based on conditions as they now exist. If, after the plans are complete and before the land takings are made, new buildings are erected or other changes in land use are made in the area to be taken for highway purposes, the State has two choices, either to follow the plans as

drawn and pay the additional land damages or discard the plans which have cost so much and start all over with new surveys on a new line to escape the changed conditions. Either choice represents an added expense to the State which could be avoided if the land takings were made promptly after the completion of the plans.

This contingency is not remote. There are many places along the line of post-war highway projects where housing developments are proposed in the immediate post-war period. The owners are cooperative but cannot hold up their developments indefinitely.

In another type of case, plans are being prepared for a highway to follow an abandoned railroad right-of-way. The railroad must liquidate its investment as soon as possible to save taxes, among other things, so cannot wait until some future date when the State may have the money to purchase the right-of-way, but is now selling it in small parcels to individuals. It will cost the

(Continued on next page, Col. 4)



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\$21,000,000,000, Total Construction Plans

Construction programs which have been announced by private enterprise and provided for by the Federal government, now totaling approximately \$21,000,000,000, give an indication of the enormous amount of construction needed after the war, H. E. Foreman, Managing Director of the Associated General Contractors of America, Inc., stated recently in discussing the outlook for the industry.

"Private construction programs which have been publicly announced total about \$6,000,000,000 and the public programs, about \$15,000,000,000," he said. "Most of these programs cover periods of from five to ten years."

Plans for construction amounting to about \$750,000,000 have been announced by the automobile companies; \$150,000,000 by chemical and paper companies; \$300,000,000 by the theatrical industry and by colleges and universities; and about \$260,000,000 by a miscellaneous group of productive industries, Mr. Foreman said. Utility companies have the largest program, with a total of about \$4,000,000,000 for modernization and expansion.

In public construction, the U. S. Corps of Engineers has a flood-control and navigation program amounting to about \$4,800,000,000 and the Bureau of Reclamation is developing a \$5,000,000,000 program, he stated. For Federal-Aid highway construction, \$3,000,000,000 for a three-year period has been provided, and for Federal aid in airport construction, the program now pending in Congress calls for the expenditure of \$2,000,000,000 over a one-year period.

As further evidence of the need for construction, Mr. Foreman pointed out that statistics recently released by the Twentieth Century Fund on estimated capital outlays during the first fifteen years after the war include about \$135,000,000,000 for construction of various kinds.

"These statistics," Mr. Foreman said, "definitely indicate that under favorable conditions construction can be an important factor in the transition from war to a prosperous peacetime economy. But both completed plans and adequate materials must be available in order for the industry to resume operations rapidly and on a scale that will provide jobs and the business stimulus that will be needed."

Du Pont Official Retires

E. I. du Pont de Nemours & Co., Wilmington, Del., has announced the retirement of Dr. Charles M. A. Stine from the Executive Committee, after thirty-eight years with the company. He will retain his positions of Vice President and Director but will be succeeded as a member of the Executive Committee and its advisor on research and development by Roger Williams, Assistant General Manager of the Explosives Department, who has been elected a Vice President and member of the Board of Directors.

A Shot in the Arm For Mass. Highways

(Continued from preceding page)

State much more to settle with these individual owners than it would have to settle with the railroad because the railroad has an incentive to sell, while the individual owners have not.

When the post-war highway program starts, there will be a great demand to get as much of it under way at once as appropriations will permit, particularly if at that time there is need for unemployment relief. If right-of-ways have not been previously obtained, there will be serious delays, particularly where buildings are to be removed.

The State is frequently criticized, and justly so, because, when land takings for highway purposes are made, the owners are given a very short time to vacate the property so that the contractor may get to work. This unfortunate situation would be avoided if the land takings were made far in advance of the start of construction and owners given a much longer time within which to vacate.

Therefore, for the reasons of less cost to the State, avoidance of delays at what may be a critical time, and fairness to property owners, the Engineers Committee recommends that adequate appropriations for the taking of land be made as soon as possible and without waiting until the end of the emergency.

Availability of Funds

To consider the ability of the Commonwealth to finance this highway program for the post-war period, it is necessary to estimate the size of the State Highway Fund in the post-war years. This in turn depends largely on the gasoline-tax collections.

The actual Highway Fund for the last pre-war year, 1941, was as follows:

Surplus (beginning of year)	\$ 2,589,851.56
Gasoline tax	21,468,015.75
Registry fees, fines, etc.	7,917,114.39
Miscellaneous	70,386.82
Total	\$32,045,368.52

The Commission estimates the average annual Highway Fund receipts for the first six post-war years as follows:

Surplus: The surplus in the Highway Fund as of July 1, 1945, was \$7,090,414.91. If highway construction continues to be curtailed for the duration of the war, this surplus will undoubtedly increase but to be conservative the Commission estimates a total surplus of \$12,000,000 to be divided over six post-war years, or \$2,000,000 per year.

Gasoline Tax: As soon as restrictions on gasoline and tires are lifted, a large increase in the use of gasoline may be expected. It is probable that the collections from the first post-war year will not exceed those of 1941, but as new cars become available the 1941 figure should be greatly exceeded. The Commission believes that it is conservative to estimate gasoline-tax collections for the average of the first six post-war years to be at least \$22,000,000.

Registry Fees, Fines, etc.: No marked increase in this figure is to be expected until new cars are available in large numbers. The anticipated increase in the gasoline tax is not from an increased number of vehicles but from increased use of those in service, a trend that was marked in the pre-war years.

The annual Highway Fund for the first six post-war years may therefore be estimated as follows:

Surplus	\$ 2,000,000
Gasoline tax	22,000,000
Registry fees, fines, etc.	8,000,000
Total	\$32,000,000

The average requirements per year for the first six post-war years are estimated by the Commission roughly as follows:

(Concluded on next page)

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FOR ALL CONTRACTORS' EQUIPMENT

A Shot in the Arm For Mass. Highways

(Continued from preceding page)

Debt service	\$ 100,000
Registry of motor vehicles	1,600,000
Insurance, Board of Appeal	70,000
Gas-tax collection	50,000
State Police	500,000
Pensions	36,000
Compensation for injuries	55,000
Share of expenses, other depts.	111,000
Temporary salary increase	600,000
Dept. of Public Works administration	45,000
Public Works building maintenance	170,000
Dept. of Public Works engineering	3,500,000
State highway maintenance	4,000,000
Chapter 81 maintenance	1,384,000
MDC administration and maintenance	1,250,000
Matching funds, Federal Act of 1944	7,500,000
Matching funds, old Federal balances	700,000
Non-federal state highway projects	500,000
Additional funds for land damages	400,000
Metropolitan parkways	500,000
Chapter 90 construction	3,000,000
Allocations to cities and towns	5,000,000
Total	\$31,071,000

The estimates contained in this summary of expected receipts and expenditures under this plan are the results of a very careful two-year study.

Summary

These monies will finance the State's share of the following six-year post-war new-highway construction program, plus all fixed and operational expenses of the state highway department, including all maintenance charges and the legal limit of appropriations for Chapter 81 (for the construction of town roads), out of the present 3-cent gasoline tax and other Highway Fund receipts.

New Construction

State highway projects	\$90,000,000
Gaps in the state highway system in cities and towns	30,000,000
Total new construction, six-year highway improvement plan	\$120,000,000
Chapter 90	\$30,000,000
Metropolitan District Commission	3,000,000
	33,000,000
Grand total, new highway projects on all public ways	\$153,000,000

The Commission states that it is its opinion that, if the Engineering Division of the Massachusetts Department of Public Works is increased to capacity and used exclusively for making plans and supervising construction, it could prepare and carry out such a program efficiently and economically. The Commission further believes that there is sufficient private-contractor personnel and equipment available for a construction program of this size.

It is estimated that at least \$1,200,000 per year will be required for land damages under this program on the state highway system. Under the terms of the Federal Highway Act of 1944, one-third of such damages can be paid out of the Federal funds, equal matching by the State will take care of one-third, and the Commission has allowed in its estimates \$400,000 to cover the remainder.

It should be noted, however, that no provision has been made to cover right-of-ways in extraordinarily large and expensive projects now being considered. Several of these larger urban projects are now in the reconnaissance stage and estimates are not yet available. It is possible that they will ultimately require special financing.

Portland Cement Assn.

New Staff Assignments

M. J. McMillan, Manager of the Washington, D.C., office of the Portland Cement Association since 1936, has been appointed Regional Manager of the Eastern Offices, with headquarters at 347 Madison Ave., New York 17, N.Y. He will be assisted in directing Association activities in this region by E. M. Fleming, District Manager in New York, who is in charge of field work in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont, and by G. C. Britton, District Manager,

Philadelphia, who covers Delaware, Maryland, and Pennsylvania.

James E. Dunn, formerly District Engineer of the Richmond, Va., office since 1938, is now Manager of the Washington, D.C., office located at 837 National Press Building, Washington 4, D.C. He has been succeeded in the Richmond post by Gordon S. Maynard, Field Engineer in North Carolina and Virginia since 1937, with headquarters at 1210 State Planters Bank Bldg., Richmond 19, Va.

Water-Hose Catalog

Various types of water hose of braided or combination construction, in weights ranging from 24.4 to 370 pounds per 100 feet and 75 to 200 pounds working pressure, are described in Catalog Section 4800 available from The B. F. Goodrich Co., Akron 18, Ohio. The Brown Brand hose is described as particularly suitable for use in construction and road building because of its extra thick, tough, and acid-resisting

qualities, while a jetting hose of special construction for high-pressure water and air service is recommended for pile-driving operations, hydraulic bank

grading, stripping, and sluicing.

Highway engineers and contractors who wish copies of this catalog section should write direct to the manufacturer.

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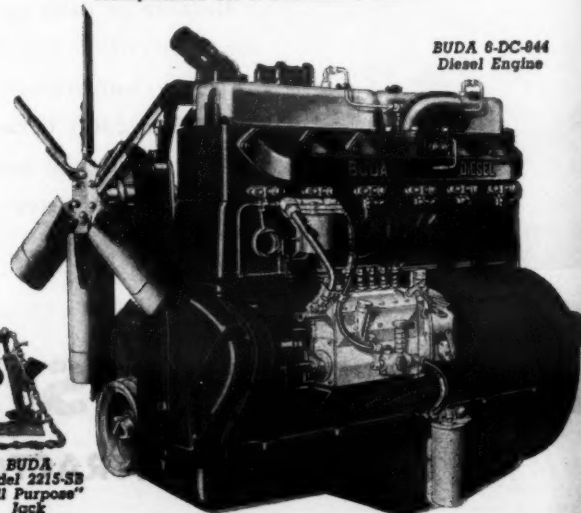
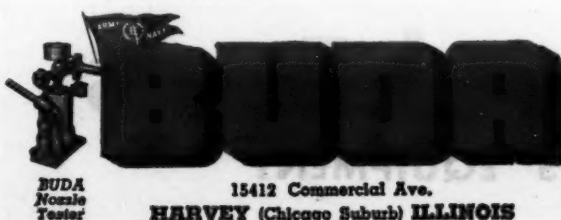

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Willow Mats Protect Eroding River Banks

Augment or Replace More Costly Riprap to Check Soil Erosion at Bridges and on Channel Changes

(Photo on page 59)

♦ **STREAM-bank protection** by willow and poplar mats has proved satisfactory, especially on channel changes and to augment more costly riprap at the ends of bridge-slope riprap walls where undercutting so often occurs. In Ohio, branches in specified lengths of 5 to 6 feet, 6 to 8 feet, and 8 to 10 feet usually cost an average of \$1.50 and \$2.00, respectively, per linear foot measured at the toe of the slope.

Preparation of Bank

Preparatory to placing the willow branches, the banks to be protected are made reasonably smooth by removing projections which prevent the branches lying flat on the slope. A trench, the back of which is on the same plane as the slope of the bank, is dug at the toe of the slope, to a maximum depth of 2 feet, measured vertically. The excavated earth is saved for backfilling immediately after placing the branches. Where soil conditions will permit without damage to branch bark, the branches may be forced into the earth to the 2-foot depth without the necessity of digging the trench, or holes for the branches may be made with crow-bars.

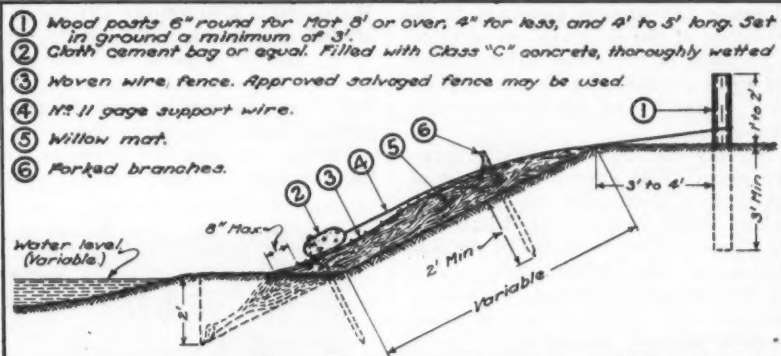
Preparing the Branches

The branches are cut in the specified lengths listed in the opening paragraph with the butt ends 1 to 2½ inches in diameter and with the side branches left in place. The branches are set in the trench so that the mat has an even surface with an average thickness of not less than 8 inches near the toe of the slope, not less than 5 inches three-quarters of the distance up, and not less than 2 inches at the top or the high-water mark. The space between butt ends must not exceed 4 inches and smaller-diameter branches are interspersed with the larger branches to avoid gaps in the mat. As much as 50 per cent of poplar branches or other approved live material may be used in this manner with the willow.

All branches in these mats must not be cut longer than 20 hours before they are placed and are kept wrapped in wet burlap or heavy cloth until used.

Tying Down the Mat

Farm field fence or similar fencing with minimum wire sizes of No. 9 top and bottom wires and No. 11 wire filler is laid over the mat, covering the entire mat area when it is 8 feet or less in height and two-thirds of the distance up from the toe of the slope when it is



Ohio has successfully protected many stream banks from erosion with willow and poplar mats, installed as shown above.

over 8 feet in height. When two or more widths of fence are used, they are securely tied together with No. 11-gage wire at 2-foot intervals. Salvaged fence is frequently used for this covering.

After the wire fencing is placed, forked willow branches are driven perpendicular to the slope to a depth of 2

feet to hold the wire in place. These branches are 1 to 1½ inches in diameter with two or three side branches 6 inches long left as forks. After the forked branches are driven, stakes, wires, and bags of cement are placed as shown in the illustration.

Payment is on the number of linear

feet, measured at the toe of the slope, completed and accepted, and covers all necessary labor, equipment, and material to complete the job.

Standards on Cement

A compilation of the nineteen ASTM standards on cement, effective in 1944-45, giving specifications and tests for cement has recently been issued by the American Society for Testing Materials. Tests for sampling, fineness, normal consistency, soundness, and tensile strength, as well as time of setting, are now issued as individual tests. The specifications cover natural, masonry, and portland cements, and also air-entraining cement for pavements. Extensive methods of chemical analysis and other physical tests are given.

Copies of this 176-page publication, with heavy paper cover, may be secured from ASTM Headquarters, 260 So. Broad St., Philadelphia 2, Pa. Price: \$1.50 per copy, with reduced prices on larger quantities.



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In addition to the No. 36 Tel Smith Gyrasphere Secondary Crusher (right) other Tel Smith equipment includes: 24" Reciprocating Plate Feeder, Bar Grizzly, 13-B Primary Breaker, two 40" x 14" Heavy Duty Washing Screens and a No. 7 Sand Tank. This producer also operates several other aggregate plants in Wisconsin—all using some Tel Smith equipment.

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G-12

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National Airport Bill Reported to House

The \$1,400,000,000 National Airport Program took another step towards realization on June 30, 1945, when H.R. 3615 was reported favorably by the House Interstate and Foreign Commerce Committee. It provides a ten-year program carrying an authorization of \$650,000,000 for airport development within the continental United States and \$50,000,000 for projects in territories and possessions. Funds for the projects in the United States must be matched dollar for dollar while the Federal government will pay 75 per cent of the cost of projects in territories and possessions. The bill calls for the program to get under way during the present fiscal year which ends June 30, 1946.

The bill directs the Administrator of Civil Aeronautics to prepare a national plan for the development of airports and authorizes the immediate appropriation of \$3,000,000 for preliminary

planning and surveys necessary to the initiation of the program. In addition, 5 per cent of the other authorizations are made available for necessary planning, research, and administrative expenses.

Seventy-five per cent of the funds are apportioned among the states on the basis of population and area, each having equal weight. The balance of the funds will be expended at the discretion of the Administrator. Any "public agency" is eligible to participate in the contemplated program. Projects may be sponsored by states, counties, and cities or a public or quasi-public corporation. Provision is also made for the joint sponsorship of two or more public agencies.

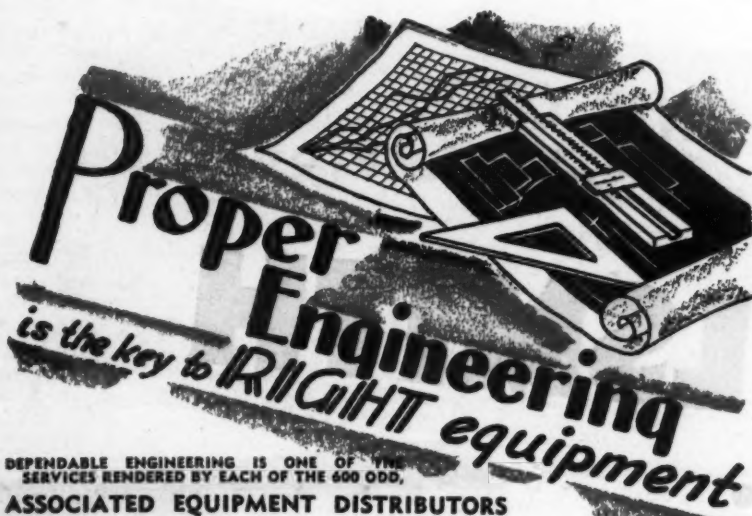
A similar measure, S.2, is pending before the Senate. The major differences between the two bills are: (1) the Senate bill is based on a five-year program, while the House bill is based on a ten-year program; (2) the Senate bill carries authorizations of \$500,000,000, while the total amount of grants in the

House bill is \$700,000,000; (3) the Senate bill requires that all funds for class 1, 2, and 3 airports be channeled through state aviation agencies, while the House version makes any public agency eligible for sponsorship.

There is considerable action to push the two bills for early enactment but

there appears little likelihood of bringing the proposals to a vote until after the Congressional recess, so that it will probably be some time in the autumn before the bills will be passed.

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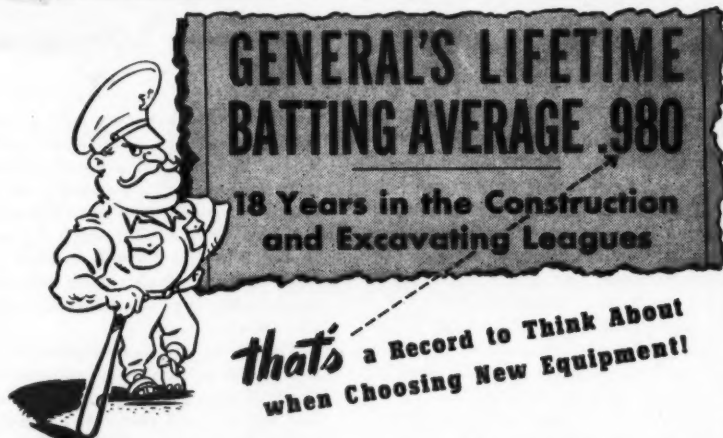
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Summer Snowstorms, Good to Think About!

**Don't Get All Heated Up
Next Winter About Your
Snow Plows; Give Thought
To Them Right Now**

By HOWARD V. PEHRSON

+ SNOW in August? Imaginary snow drifts, of course, but the ice and snow that will swirl onto the nation's highways and flightways in three or four months will be very real—not only real snow, but will bring with it real headaches as well unless some time is spent in the summer sun, perspiring over next winter's snow-removal problems. There are tricks which may be used now, summer brainstormers which will go a long way towards outwitting that old opponent of year-round transportation, Bitter Winter.

The state and county engineer, and the maintenance engineer at the airport, will recognize that road and runway maintenance during the next snow season will be the most difficult since the outbreak of the war. The urgent demands of the armed forces for practically all maintenance equipment and parts and the general obsolescence of the snow-fighting units at hand complicate the task. A little ingenuity this summer will, however, help to meet the critical situation.

Tall Corn an Aid

There is a county engineer in Iowa, for example, who, even before the war, was meeting his own particular local snow-removal problem by preparing for the next winter in the heat of the summer. This engineer was confronted with continually mounting demands for additional miles of snow-free county roads. Frankly admitting his inability to buy more snow fencing, let alone new equipment, he made the rounds of the county during the early summer, discussing the advantages of open winter roads with the farmers and asking their cooperation. All they need do, he would tell them, would be to leave four or five rows of corn standing along the edge of the highway in the autumn (See C.& E.M., Dec., 1939, page 11).

This natural snow fencing worked so well the first winter that farmers who would not cooperate at first were eager to assure themselves of the advantages of clear farm-to-market roadways the next and succeeding years. Some study of local topography and knowledge of prevailing winter winds are necessary for the successful application of the natural-snow-fence plan, but most county engineers who spend a little summer sweat on it will find it will go a long way towards the solution of snow-fence shortages.

Streamlined Sections

A Minnesota county engineer has another plan which he started upon as soon as the frost went out last spring. In this county during the past seven or eight years, a long-range county road reconstruction program, looking towards eventual complete replacement of all county roads with new snow-resistant streamlined cross sections, has been under way. This engineer also enlists the cooperation of local farmers, convincing them that "donations" of right-of-ways which the county highway department cannot afford to purchase are to their own individual advantage.

The streamlined snow-resistant county roads reconstructed over the 100-foot right-of-way widths run from 32 to 36 feet shoulder-to-shoulder, with center sections somewhat higher than the fields. The ditches are shallow and

the backslopes broad to the full width of the right-of-way. Snow removal over these streamlined county roads is no problem.

Although restricted in the amount of reconstruction that may be undertaken while the war continues, this same engineer is alleviating his coming snow problems by gathering more 100-foot right-of-ways, flattening out the slopes and completing the removal of all weeds and brush. This is allowable under routine "maintenance" and will prove its worth next winter when no steep ditches and roadside brush remain to invite drifts.

Order Now: Buy Right

Still another engineer, in North Dakota, who always has been faced with

plenty of demands for snow removal but very little money, again this spring repeated his old procedure of inventorying his plows and other snow-removal equipment and noting exactly what replacements and repairs would be necessary. This engineer is spending odd moments during the summer in the shop, welding and hard-surfacing plows and making minor repairs himself wherever possible. He also has placed his order, well in advance of the usual seasonal rush, for his quota of necessary parts and replacements.

This engineer learned another trick several years ago. He observed that often ordinary wire rope which met the light requirements of summer-maintenance loads and stresses would not stand up to the shock and strain of winter work in sub-zero temperatures. He discovered that a preformed-type wire rope used in place of the ordinary rope would, however, meet summer heat and abrasion and winter shock and "cold fatigue" without weakening or snapping. This greater resistance of a

preformed wire rope to load, wear, and weather is due to the engineered design of the rope which distributes the load and wear evenly over each strand and wire in the cable, to the high quality of steel which is used in manufacturing preformed wire rope, and to the exacting care in spinning the cable.

Although wire rope has gone to war just as have trucks and tractors and although preformed cables are now being used to lift great loads of bombs, to load and unload cargoes of war matériel, as well as to dig away in the borrow pits for fill for new airports, there still is some available on proper priority. The maintenance engineer who places his order now for his winter requirements of preformed wire rope will be assured of delivery, on time.

The placement of orders for winter-maintenance parts and equipment is scarcely a trick. It is an absolute *must* for every engineer who has a need to be filled. There still are a few trucks, a few plows, a few tractors and graders

(Concluded on next page)

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Summer Snowstorms, Good to Think About!

(Continued from preceding page)

which may be obtained, but the demand is high and the red tape entangling. If you, as an engineer, hope to place new snow-removal equipment in operation next winter, now is the time to seek the funds and now is the time to place the order. You will find your dealer has all the facts and can take a good deal of the burden from your shoulders.

Gray Matter Helps

For other engineers who cannot purchase new equipment, or replacements, the coming winter may mean new methods, using whatever is at hand and in working condition. Many airport engineers have solved the snow-removal problem by rolling and packing the snow rather than removing it. In some areas of light snowfall, home-made plows, although not as successful as the efficient machines on the market, have

at least removed enough of the snow to prevent serious blockades.

Increased use of chemicals, such as calcium chloride or salt, in treating stockpiles and road surfaces has been noticed in many counties. Other sections have depended on a wider application of abrasives, such as cinders, sand or gravel, to prevent skidding on snow-glazed roads where removal was impractical or impossible.

Whatever the problem and whatever the area, one thing is certain: the summer strategist will be the one who wins his winter-maintenance battle this year. This may be the last of the "duration" maintenance years. It's sure to be the most difficult. Anticipate, sweat it out now, and you can again this year successfully meet the challenge of winter.

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weld metal deposit, operating characteristics, recommended current ranges, and other information.

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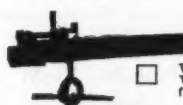
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A Refresher Course In Truck-Tire Care

Natural-Rubber Tires Are Still a Long Way Off; Check Up on Your Care of Tires And Make Them Last

IN discussing the care of tires on vehicles, we should start with air pressure. It is well to remember that it is the air within the tire which carries the load and not the tire itself. Heavy-duty tires are designed to operate at approximately 12 per cent deflection, and any air pressure which changes this percentage of deflection, either upward or downward, will have a definite effect on the tires. Too much air pressure will result in rapid tread wear and an increased tendency towards bruises. Too little air pressure causes excessive flexing and may result in fabric breaks around the entire circumference of the tire, in addition to rapid or uneven tread wear.

In one Naval District, and perhaps this is part of a general plan for all districts, each vehicle carries on each axle a stenciled air-pressure recommendation for the tires. This is very good practice, and the only suggestion to add is that a careful study be made of each operation, to see that the air-pressure recommendations for each vehicle are actually in line with the maximum loads carried on the vehicle.

Air Pressure in Dual Tires

It is sometimes desirable to vary the air pressure between dual tires, particularly so when it is found that pressure build-up in service is greater in one tire than it is in the other. Quite often in high-speed truck operations, either due to crowned roads or sprung axles, the inside tire builds up pressure faster than the outside tire, and when this occurs, it is desirable to adjust the pressure in the outside tire, that is, increase the pressure over standard recommendations, sufficiently to take care of this difference in air-pressure build-up. When this is done, all four tires will pick up their equal share of the load, and the possibility of ruining the tire in the inside position is lessened. It has been found on some operations that a 15-pound differential is needed to bring about proper distribution of load on all the tires on the axle, but normally a variation of from 5 to 10 pounds is sufficient.

Loads

In any discussion of tire care, we cannot overlook the load factor. If an analysis of your vehicles indicates loads greater than the carrying capacity of the tires on the vehicle, then by all means the tires should be replaced with larger ones to provide sufficient carrying capacity to do the job. Too much emphasis cannot be placed on the relationship between air pressure and load. Don't try to compensate for overload by increasing pressures beyond the schedules given in the Tire and Rim table. Others have tried it and it does not work. In the civilian trucking field in

pre-war days, when tires were made with good old natural rubber, we could get away with a lot, but now that we are using the synthetic truck tire of various combinations, the pre-war recommendations which were often spoken of as "shoulds" now become "musts".

Speed and Heat

Truck tires, because of their thickness, generate a certain amount of heat, and the heat, of course, increases as the speed goes up. Consequently, it is essential that speeds of trucks, especially the heavier trucks, be kept down as much as possible, to reduce the running temperature of the tires.

Some time ago, the Tire and Rim Association studied this problem to determine the effect of speed on tire per-

EFFECT OF LOAD AND SPEED ON TIRE SERVICE;
PERCENTAGES OF RECOMMENDED MAXIMUM LOADS AT MAXIMUM
SUSTAINED SPEEDS TO OBTAIN NORMAL SERVICE

Number of Piles in Tire	Maximum Sustained Speeds—Miles Per Hour										
	25	30	35	40	45	50	55	60	65	70	75
6-ply						100	96	91	85	78	70
8-ply					100	95	89	82	74	65	53
10-ply				100	94	87	79	70	58	40	
12-ply			100	93	85	76	63	45			
14-ply		100	92	82	70	53					
16-ply	100	90	78	61	29						

formance and developed the accompanying table.

Note that a 10-ply tire will carry 100 per cent of its rated load up to 40 miles per hour, but if the speed is increased to 50 miles per hour, the tire will carry only 87 per cent of its rated load. At 60 miles per hour it will carry only 70 per cent.

While manufacturers have tried not to differentiate between all-rubber tires and synthetic tires, insofar as load and speed recommendations are concerned, however, the fact that synthetic tires operate at temperatures higher than rubber tires should be sufficient warning to keep speeds under 40 miles per hour and to keep loads well within

the maximum limits as established by the Tire and Rim Association.

Further, on the subject of heat, there are still some people who believe that tires should be bled to relieve build-up of air pressure caused by heat. This, of course, is a fallacy and experience has taught us not to bleed tires regardless of the amount of air-pressure build-up involved.

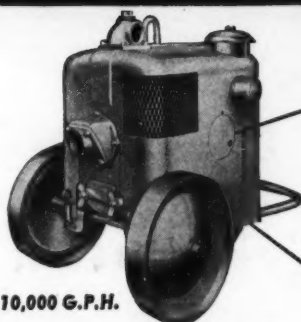
Mismatched Duals

Now a few words about mismatched duals. A very large percentage of dual-tire failures is caused by lack of proper differential in air pressure or from improper matching of dual tires. When

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ENCLOSED YET FULLY ACCESSIBLE

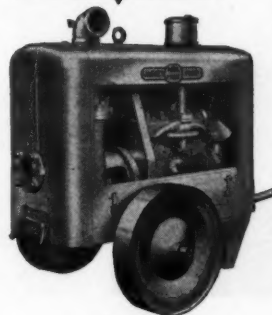
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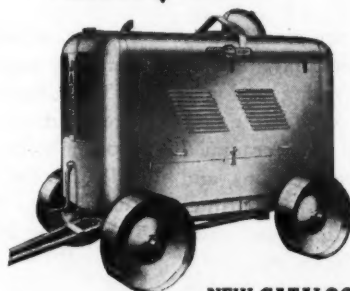
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4"—40,000 G.P.H.



10"—240,000 G.P.H.

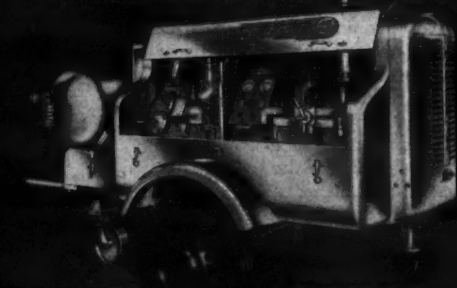


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Truck-Tire Care

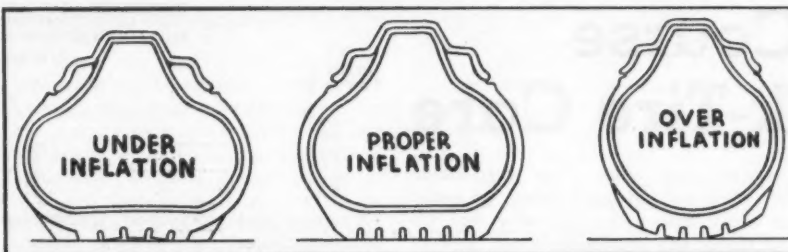
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dual tires are improperly matched, more load is carried by the larger tire, usually causing that tire to be overloaded, often resulting in early failure.

In case you haven't already done so, instructions should be given to all equipment men to see that dual tires are always properly matched. It is a good plan to use a caliper to measure diameters, but if such a tool isn't available, the circumference can be measured with a steel tape. All measurements should be taken after the tires are mounted and inflated. This is important, because some tires are molded differently from others and the inflated measurements are the only sure way of determining correct diameter or circumference. Obviously, you will find variation in measurements due to tread wear and differences in growth after service, and if tires of exact measurements are not available, the smaller tire should always be placed on the inside dual position. Tolerance of $\frac{1}{4}$ inch in diameter or $\frac{3}{4}$ inch in circumference is permissible, but be sure to place the smaller of the two tires on the inside dual position.

Load Analysis

Emphasize to your truck drivers the importance of proper loading, to prevent overload on any one axle. This is very important and is something that has to be watched very carefully, because it is only human to load the light material forward and place the heavy burden on the tail end of the truck. This



Proper air pressure in tires is vital to their long life. Too little pressure increases the percentage of deflection and may result in fabric breaks in addition to rapid or uneven wear; while overinflation reduces deflection and contact area, resulting in rapid wear and increasing chances of bruising. Proper inflation insures maximum road contact, and long service life.

practice may have its back-saving advantages, but it will break the backs of the rear-axle tires if it is indulged in. Always pile the load forward, if it is possible to do so.

Removal for Recap or Repair

Much attention should be given to the removal of tires for repair or recap, before they are ruined. The tire men in your various activities should be in-

structed to check tires very carefully for cuts or snags and remove them immediately for proper repair. This is particularly important with synthetic tires, because synthetic tread compounds do not have the same tensile strength as crude-rubber compounds and cuts must be repaired promptly to prevent growth of the injuries. Tires should be removed for recapping when the design becomes smooth, rather than

to attempt to get every last mile out of the original tread before recapping. Best recapping results are obtained if the tires are removed for recapping before the breaker begins to show through. This is important, because we are going to be forced to make the most of what we have. To do this, present tires must be recapped AGAIN and AGAIN and AGAIN.

Tubes

Most of our readers are familiar with mounting instructions for synthetic inner tubes. It is very important that every care be taken in the mounting of both GR-S and GR-I inner tubes, to eliminate any possibility of excessive stretch due to failure of the tube to shape itself to the tire. Synthetic inner tubes (particularly those of the GR-S type) are not as elastic as natural-rubber tubes. Hence, unless the tubes are lubricated thoroughly when they are mounted, localized stretching may cause failure.

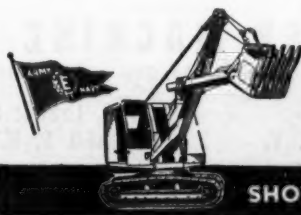
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Truck-Tire Care

(Continued from preceding page)

Some time ago the industry prepared a poster showing the steps to be taken in mounting all-synthetic tubes. In this poster it recommended that vegetable-oil soap be used to lubricate both tube and flap and thus eliminate any possibility of localized stretching. In mounting synthetic tubes and flaps, there are four important steps to keep in mind: 1. Lubricate; 2. Inflate; 3. Deflate; 4. Re-inflate.

Summary

To sum up, it will be well to keep the following in mind:

1. Maintain proper air pressure. This applies to passenger tires as well as truck tires. Follow Tire and Rim recommendations and inflate when cold. Some people have the mistaken idea that synthetic tires must be operated at higher pressures than natural-rubber tires. This is a fallacy, because a synthetic tire is not as resistant to bruises as a natural-rubber tire, and if higher than standard pressures are used, premature failures are apt to occur.

2. Use slightly more air pressure in outside duals, if air-pressure studies indicate the inside tires are building up more pressure than the outside tires. Usually, a differential of 5 to 10 pounds is sufficient.

3. Do not overload and, by all means, do not attempt to compensate for overload with overinflation. The proper size of tire is the correct answer to the overload problem.

4. Pay particular attention to load distribution. Place the load forward as much as possible. Avoid speeding, but if high speeds are necessary, follow the Rubber Manufacturers Association recommendations by reducing the load.

5. Do not bleed tires, regardless of the amount of air-pressure build-up involved. If the air-pressure build-up is excessive, a change to a larger size of tire or reduction in speed is needed.

6. Match duals to within 1/4 inch in diameter or 3/4 inch in circumference and always place the smaller of the two tires on the inside dual position.

7. Be sure there is enough spacing to provide ample clearance between dual tires. Watch for rocks which may become lodged between dual tires and have them taken out as quickly as possible. To operate a vehicle with rocks lodged between the dual tires is not only injurious to the tires, but it is also very dangerous, as sometimes the rocks become dislodged when the vehicle is moving and anything can happen.

8. Valve caps should always be used as a protection against slow leaks caused by faulty valve insides. Valve caps also act as a seal to keep dirt and moisture away from the valve inside.

9. Rims should be kept clean and in good condition. Bent flanges should be straightened to prevent premature bead failures. Make sure the rim is large enough to accommodate the tire.

10. Flaps are also very important. Generally, it is the rim that determines the size of flap to be used. Be sure to select a flap wide enough to give ample protection to the tube. Used flaps take a permanent set and their re-use must be restricted to the same size of tire and rim from which they were originally removed.

Prepared from a paper presented by C. R. Mason, Service Manager, The B. F. Goodrich Co., before the Tires Maintenance Officers' School, Akron, Ohio. The Tire Rim Association Truck and Bus Handbook and other manuals on the care of tires are available from Goodrich or other leading tire manufacturers.

New Standards List

A new list of all American Standards and War Standards approved to date has just been published by the American Standards Association and is available free of charge. There are approxi-

mately 800 standards listed in the booklet, covering specifications for materials, methods of tests, dimensions, definitions of technical terms, procedures, etc., in the civil-engineering, construction, transportation, and various other fields. For ready reference, the standards are listed alphabetically as well as by engineering fields, and include 137 safety standards. There is also a separate list of the War Standards.

Copies of this list may be secured gratis by those interested direct from the American Standards Assn., 70 E. 45th St., New York 17, N. Y.

Tournarope Wall Chart

A 17 x 22-inch wall chart, giving the complete cable requirements for all LeTourneau scrapers, Rooters, cranes, trailers, bulldozers, pushdozers, and Angledozer, and designed especially to be of practical assistance to operators and maintenance men, is now available. With emphasis on service, the chart gives practical tips for securing longer

service from wire rope through proper lubrication, operation, and maintenance.

Copies of this chart, suitable for

hanging up on the field-office or shop wall, may be obtained by writing to R. G. LeTourneau, Inc., Peoria 1, Ill., and requesting Form No. N-104.

ALL OVER
TORO
POWER MOWERS
THE WORLD

TORO MANUFACTURING CORP'N.
MINNEAPOLIS, MINN.

MOWING MACHINERY SPECIALISTS FOR OVER 20 YEARS

"A NEW HAND"
with Nimble Fingers

FOR MAINTENANCE
AND
PRODUCTION MEN

THE MASTER LATHE CONVERTER

VERSATILE . ACCURATE . FAST!

Maintenance and production men are constantly called upon to repair a broken part or make a new tool. Speed is imperative. Shut-downs and production delays are costly. More often than not the needed part or tool requires a great many different machine operations, more delays. Pulling single purpose machines out of regular production and setting them up for special operations adds more cost.

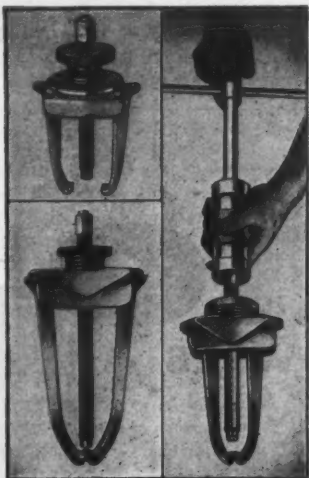
The answer is: the Master Lathe Converter — it's portable, compact, simple, and accurate. The interchangeable heads can be quickly adjusted to perform almost any metal operation. For versatility, accuracy, and speed, equip with a Master Lathe Converter!

Catalog No. 10 includes Operating and Maintenance Manual — ASK FOR IT

the **MASTER MANUFACTURING COMPANY**
HUTCHINSON, KANSAS, U. S. A.



ADDRESS DEPT. CE



This matched set of gear pullers is designed to provide the proper tool for a wide range of repair jobs.

Gear-Puller Tools Now in Matched Sets

In every phase of equipment-maintenance operations, the right type and size of tool can make significant savings in job time, with greater accuracy, less effort, and increased safety to both operator and machine. Pulling operations are no exception, and for this reason, a new series of matched gear pullers, to provide the proper tools to cover a wide range of pulling utility, has been announced by Snap-on Tools Corp., Kenosha, Wis.

The series includes three sizes of standard pullers with maximum jaw capacities of 4½, 8½, and 14 inches. In addition, the small and medium sizes are also available in the slide-hammer design, or they can be furnished with all parts necessary for use as either standard or booster puller hammers, providing adaptability of the puller to the characteristics of each pulling job.

The yoke and jaw construction is identical on all models, with a powerful spring-controlled jaw lock designed to give a safe, slip-proof, and tip-proof grip on the part to be pulled. The long jaws allow the use of the puller where the shaft extends some distance through the gear or other part to be removed and are slenderized to permit work in rather close places. The hexagon end on the standard-model pressure screws can be turned with standard wrenches. The two smaller sizes take a ¾-inch wrench, and the large model, a 1-inch wrench.

On the slide-hammer-type pullers, the centralized guided shock of the booster hammer, combined with the screw tension, provides a pulling force which distributes the pull equally, and removes the part safely and quickly.

For further information on these Snap-on gear-puller sets, direct your inquiries to the manufacturer and mention this item.

New P&H Electrode For Welding Cast Iron

After years of research and experimentation, a new all-position mild-steel electrode for welding and repairing cast iron has been announced by the Harnischfeger Corp., 4419 West National Ave., Milwaukee 14, Wis. Described as completely different in its operating characteristics, this new Harcast electrode fuses well with either mild or medium-carbon steel, making it suitable for joining cast iron with various types of steel, according to the manufacturer. With a yield point of 50,000 pounds psi, the deposited metal has an ultimate tensile strength of 60,000 pounds, roughly double that of a good grade of cast iron.

Harcast can be used with either ac or dc machines (straight or reverse polarity on dc), and works well at low amperage, thus minimizing the dilution

effect at the fusion zone and permitting a high quality of machining. Reverse polarity on dc current produces a smooth bead with deep penetration. On dc straight polarity, penetration is less, higher beads are built, and there is less spread in the fusion zone. With ac or dc straight or reverse polarity, Harcast is said to assure a sound deep weld with any good grade of cast iron.

Readers of CONTRACTORS AND ENGINEERS MONTHLY may secure full particulars on Harcast electrodes by writing direct to the manufacturer and mentioning this news item.

Counties to Select Own Roads for F-A

Ohio counties are already working at their plans for post-war secondary-road construction and recently met with State Department of Highways engineers to discuss their participation in Federal Aid for secondary roads. The total secondary-road fund allocated to

Ohio by the 1944 Federal-Aid Act is \$4,658,000, to be matched by the local subdivisions for road improvements.

Each Ohio county will be permitted to select its own system for using Federal-Aid money for secondary roads, all subject to the approval of the Department of Highways. Counties will be allotted their shares on the basis of 10 per cent of the proceeds of the gasoline taxes collected within the county

and license fees paid in 1940.

Funds for the preparation of plans and specifications and the making of surveys are already available for the counties. The Federal funds for construction will become available for actual use following the President's proclamation that the war on all fighting fronts is over or when Congress declares that the war emergency no longer exists.

MONDIE DROP and UPSET FORGINGS

FOR CONSTRUCTION EQUIPMENT

Such as Dipper Teeth, Trencher Teeth, Gear Blanks, Levers, Tie Rods, Cranks, Crank Shafts, Special Shapes, etc. Forging weight range from 1 to 50 pounds.

Inquiries given prompt attention by our Engineering Dept.

MONDIE FORGE COMPANY INC.

10299 Berea Road Cleveland 2, Ohio

HOW TEAMED-UP STACKERS PILE UP BIG TONNAGES WITH LITTLE UPKEEP



Simultaneous, continuous, and high speed surge storage of several sizes of aggregate by 110-foot Barber-Greene Stacking Conveyors—that's the answer to this huge crushing plant's low stockpiling costs.

No other material handling equipment is so stingy with power . . . requires so little attention . . . maintains such high capacity hour after hour with such economy of upkeep.

No matter what type of conveying equipment you need, you're bound to benefit by Barber-Greene *pre-fabrication*. Drives, carriers, take-ups, and trusses are *standardized*. Units are interchangeable. Alterations, rearrangements, and relocations are quickly and easily made.

B-G *pre-engineering* saves you many dollars of needless expense in maintenance and belt replacement—saves time and labor in permanent conveyor installations.

Barber-Greene builds many types of portable and permanent conveyors. When you have a material handling problem call on B-G engineers to help you. They'll show you how B-G Conveyors can do the job cheaper and more efficiently. Barber-Greene Company, Aurora, Illinois.



Nothing beats a B-G Bucket Loader for reclaiming bulk materials from stockpiles. It's fast, easy to maneuver, and gives many years of trouble-free, economical service. Built in various sizes and models.

Barber-Greene Constant Flow Equipment



New Cummins Dealership In Colorado Territory

Sale of the Denver dealer franchise for Cummins diesel engines to Jay B. Chambers, Cummins Regional Manager in the mid-continent area since 1935, has been announced by the Cummins Engine Co., Inc., Columbus, Ind. Since 1942, the Denver dealership has been owned and operated by the manufacturer under the name of Cummins Diesel Sales of Colorado, Inc. With the sale of the property to Mr. Chambers, the organization will be known as Cummins Diesel Sales of Colorado Co.

Under the new ownership, the sales

and service organization will continue to occupy its present modern quarters at 2501 Champa St., Denver, which include a large and completely equipped shop, a special fuel-pump department, and a well stocked parts department. The entire staff of fifteen employees, including eight factory-trained Cummins mechanics, will be retained, with Lars O. Prestrud remaining as Manager.

The Denver dealership serves all of Colorado, southeastern Wyoming, western Nebraska, and western South Dakota.

Back the attack on Japan by buying
more War Bonds!

New Pictorial Catalog On Bay City Shovel Line

An interesting and unusual pictorial catalog on the Bay City line of excavating and materials-handling equipment, showing as many applications as possible with a minimum of text, has just been issued by Bay City Shovels, Inc., Bay City, Mich. The company believes that this type of catalog will enable potential users to get a preview of the wide range of equipment for post-war jobs and determine quickly the right size and capacity for their individual needs.

In addition to many photos of Bay

City equipment in service, there are detailed parts and assembly descriptions illustrating the operating advantages. The convertible features of the crawler models are emphasized by the illustrations of them in operation as shovel, crane, dragline, clamshell, and hoe. Another section is devoted to the pneumatic-tire-mounted CraneMobile, showing the automotive design of the special crane carrier and the adaptability of these units.

Copies of this new pictorial Catalog L may be secured by interested contractors and state and county highway engineers direct from the manufacturer. Just mention this review.

MEN WHO OWN BLACK TOP PAVERS...

**CHOOSE Adnun
for OPERATING ECONOMY**

EXPERIENCED MEN who have worked with all types of black top pavers... what do they think of maintenance costs on an Adnun Paver? Without exception they agree that the low maintenance costs of an Adnun are truly remarkable... far below the usual expenses which are encountered in other paving machines. Reasons for this operating economy are not hard to find... Adnun Pavers are built to remain in top operating condition, with a minimum of attention. Example... the rigid cross-braced frame is more than adequate to absorb the strain of handling heavily loaded trucks... keeping bearings and shafts in line. Power take-off is through heat treated alloy steel bevel gears, fully enclosed and running in oil, mounted on anti-friction bearings... rear rollers are mounted in cast steel frames and the cutter bar is fully enclosed, can't be bent or warped. Trouble-free operation is the rule rather than the exception. For further information on these economical pavers ask an Adnun owner, see your nearest Foote distributor or write direct.



ADNUN
TRADE MARK REGISTERED

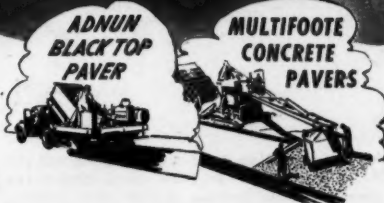
BLACK TOP PAVER

WITH CONTINUOUS COURSE CORRECTION

THE FOOTE CO., INC.

1916 State Street ★ Nunda, N.Y.

The World's Largest Exclusive Manufacturers of Concrete and Black Top Pavers

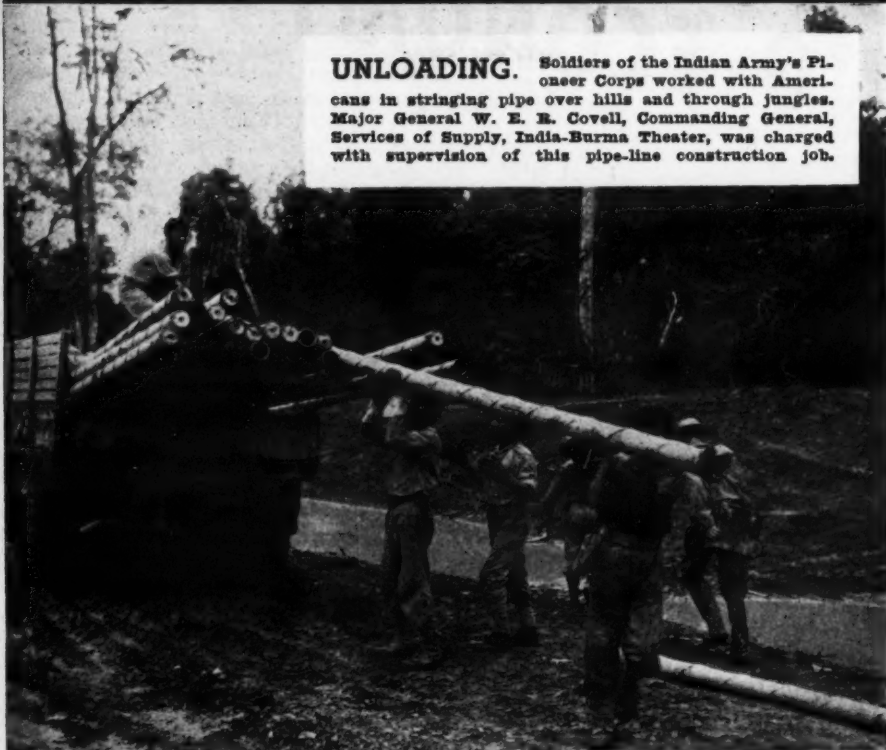


PIPE of 4 and 6-inch-diameter light-weight "invasion type" for the India-Burma-China line was delivered to the job by water, rail, road, or air. Here 10-ton Diamond T trucks start out with their loads for the Assam-Burma section.



RAIL. In some sections, railroad transportation was available. Under these conditions, a crew of eight men could throw off 2 miles of pipe in about 1½ hours. Another crew followed to connect the pipe sections.

UNLOADING. Soldiers of the Indian Army's Pioneer Corps worked with Americans in stringing pipe over hills and through jungles. Major General W. E. R. Covell, Commanding General, Services of Supply, India-Burma Theater, was charged with supervision of this pipe-line construction job.



Gasoline For the V

Neither Monsoons nor Jungle nor Mountains nor Jap Snipers Could Halt S.O.S. Troops, Aided by Indians And Chinese, in Construction of World's Longest Pipe Line

(U. S. Army Signal Corps Photos)

VALVES. One of the manifold installations along the nearly 2,000 miles of pipe line built by Engineer Petroleum Distribution Companies.



AT THE IRRAWADDY. Native coolies dig a path for the pipe on a bluff overlooking the Irrawaddy River where the line is carried across on the river bottom.



OVERHEAD CROSSING Stringing stream of Ledo Road. Completion of the line making supplying fuel to traffic along the Indo-Burma the Stilwell.

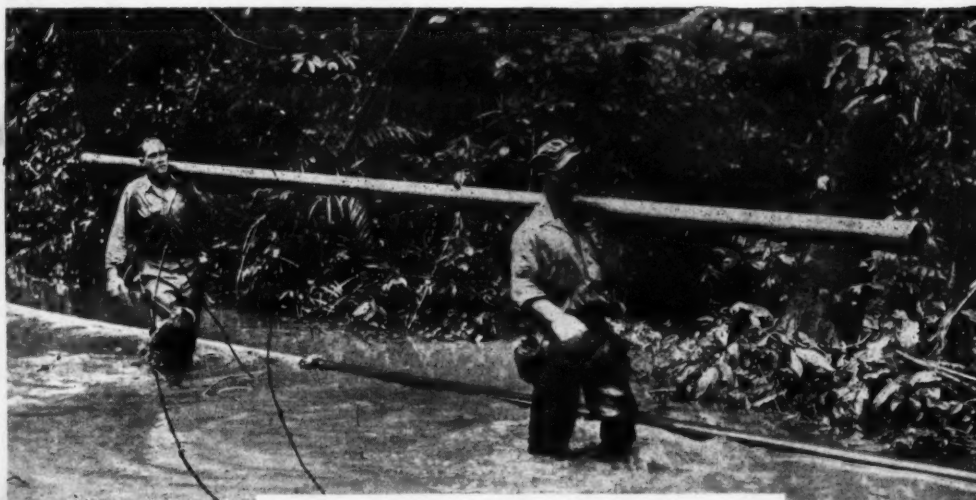
"JEEP TRAIN." The "Pipe Line Special" of the Jeep Train arrives at the Mogaung River, where the pipe was unloaded by natives of jungle tribes and carried to the river bank.



OVER THE HUMP. For the Chinese end of the line, pipe was flown in over the Himalayas. The completion of the line means more effective use of the "Hump" route, as now transport planes can refuel in China instead of having to carry their own gasoline for the return trip.

War in China

nor
I Ho
as
of



KNEE-DEEP in a jungle stream, men of the S. O. S. lay pipe along one of the many rivers which created problems for both them and road builders. Major General Lewis A. Pick, well known for his work on the Stilwell Road, handled the work on the final section of pipe line.



COUPLING crew, many of them oil-field workers in civilian life, could string and couple an average of 3 miles of pipe a day. The most difficult operations were in the rugged terrain where many steep hills required heavy equipment to aid in the work.



WELDING sections of pipe for the Irrawaddy River crossing, where the couplings generally used would not suffice. Each line crossing the river weighs 7 tons, plus 2 tons of concrete reinforcement to hold the pipe on the river's bottom.



"GREATEST OF EASE." Pipe-line walkers who work on the 380-foot overhead suspension across the Namyung River in northern Burma belong in the category of "that daring young man". Each day two men of the company maintaining this section of the pipe line walk over the line, checking for leaks or damage due to landslides.

SSIN
Stringing up an overhead
stream crossing along the
of the line makes possible also
along the Burma, now renamed
Stilwell.

Wilbur F. Creighton, Engineer and Builder

(Continued from page 8)

contractor," said Creighton, "where the odds of competitive construction are all against him and the reward is small. In this field the contractor sells his product before he buys the raw material. Forces of nature, changes in market, labor efficiency affecting the cost are guessed at months before they are encountered or purchased. Seeking the riches of the earth under the ground may be a greater gamble, but does not so richly reward the successful operator for satisfactory accomplishment because he is not as much responsible for success or failure. Even the use of experience or persistence cannot guarantee success, but in construction the keenest pleasure results when a difficult problem has been solved within an estimated cost, and unexpected difficulties have been overcome by the exercise of ingenuity and energy.

"Then after completion," Creighton continued earnestly, "the silent satisfaction that his labors will serve unborn generations and that his work will be studied hundreds of years later is something which mere money-making could not create. Money is not the main reward but is only a means of seeking new scenes of endeavor and more hazardous ventures in a larger sphere of service."

Many Projects

It is not rash to predict that construction by Foster & Creighton will outlast the years. Since the advent of modern highway construction, the company has completed about 250 miles of concrete highways in Kentucky, Tennessee, and Alabama, with bridges and other drainage structures. One of the most beautiful of their works is the Parthenon at Nashville erected in 1929 as a reproduction, in every detail except in materials used, of the famous Greek architectural masterpiece in Athens.

During the depression of 1930 to 1934 the company was able to continue its existence by accepting small contracts, and kept its organization intact with but few exceptions. Company policy has been to retain its best workers even at a deficit and to pay them to sit around idle if necessary rather than accept contracts at a loss. Thus when the PWA began its extensive building program, Foster & Creighton was ready with a well trained organization to accept contracts for all types of construction.

Some of the company's larger works are the Cheatham Place Housing Project at Nashville, constructed in 1936, and the College Hill Housing Project at Chattanooga in 1939. Doubtless the most important project finished by the company in its history was Camp Forrest at Tullahoma, Tenn., for the U. S. War Department, which was done with the Hardaway Contracting Co. as an associate. This work consisted of 1,372 buildings, containing a floor space of 110 acres; 10 miles of concrete highways; 40 miles of macadam highways; 110 miles of underground sewer and water mains; a pumping station connected with the camp by about 8 miles of 26-inch pipe; a sewage-treatment and a water-purification plant; and a 1,500-bed hospital with a central steam heating plant. This work cost \$22,000,000 and was completed in five months during the winter of 1940 and 1941. At the peak of progress, 20,000 men were employed.

Recently the company, associated with the Oman Construction Co., built a concrete highway near Knoxville, Tenn.; a shell-loading line for the Gulf

Ordnance Plant at Aberdeen, Miss.; and is now building a \$10,000,000 plant for the Goodyear Rubber Co. near Nashville, which project is being financed by the Defense Plant Corp. The main building in this plant will be 1,000 x 400 feet.

Other Interests

"I'm getting too old for this construction game," Creighton remarked with a smile. "It is a wearing, tearing business and I am about ready to retire and let my younger brother, my son, and son-in-law carry on while I spend my time in writing and research. I really would like to farm but lack the necessary training. Being raised on the streets of Nashville and spending a lifetime on construction provide a poor background for farming."

Wilbur Creighton makes his home in Nashville with his wife. They have two children, a daughter and a son; the latter is Vice President of the company but is now a captain in the Army, while

(Concluded on next page)

For Speedy heating of tar and asphalt—

Use this CONNERY oil-burning Patching Heater on the small job and this CONNERY oil-burning kettle for large-quantity production.

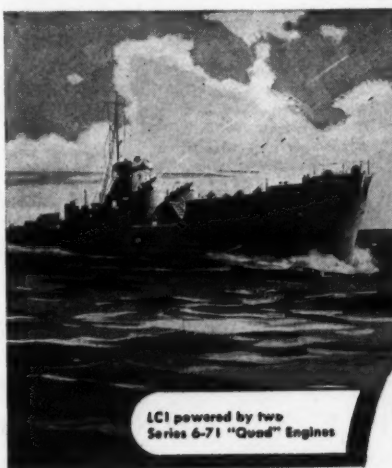


Write for catalog showing our full line of tar and asphalt heating kettles, spraying attachments, pouring pots, etc.

Connery Construction Co.

2nd and Luzerne Streets

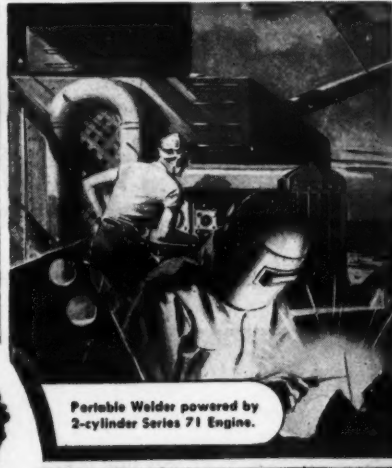
Philadelphia 40, Pa.



LCI powered by two Series 6-71 "Quad" Engines



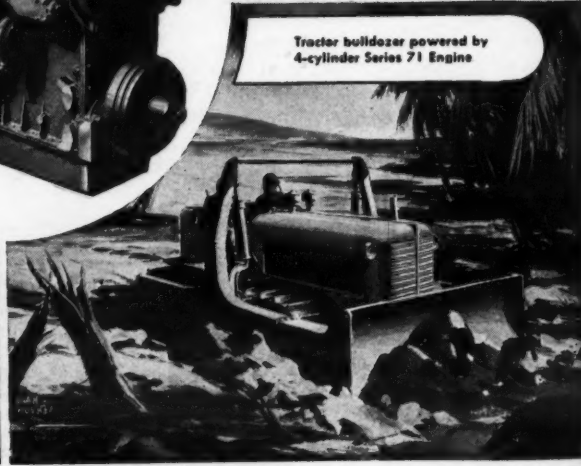
M-4 tank powered by Series 6-71 "Twin" Engines



Portable Welder powered by 2-cylinder Series 71 Engine



Army Shovel powered by 3-cylinder Series 71 Engine



Tractor bulldozer powered by 4-cylinder Series 71 Engine



Basic 6-cylinder Series 71 Engine

THERE WHEN NEEDED

In addition to providing plenty of dependable power for the machines our fighting men use, this engine, because of its interchangeable parts, helps them keep everything on the move.

For example, a shell-torn shovel or tractor engine can be fixed with an engine part from a wrecked landing craft. A landing craft can keep going by picking up a part it needs from a disabled tank.

Every GM Series 71 engine, whether a two-cylinder or one of a "Quad" six, has the same bore and stroke, and most moving

parts from one engine will fit and work perfectly in any other.

This feature of interchangeability of parts in these engines will be equally important in peacetime. The elimination of *different* sizes of parallel parts increases the availability to owners of the right part *when it is needed*.

In construction, fishing, transportation and all through industry, these "Single", "Twin" or "Quad" GM Diesels will provide dependable, low-cost and *easily maintained* power.

KEEP AMERICA STRONG
BUY MORE WAR BONDS



SINGLE ENGINES... Up to 200 H.P.

MULTIPLE UNITS... Up to 800 H.P.

DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.

ENGINES... 150 to 2000 H.P. CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, Ohio

LOCOMOTIVES... ELECTRO-MOTIVE DIVISION, La Grange, Ill.

Wilbur F. Creighton, Engineer and Builder

(Continued from preceding page)

his son-in-law is in the Navy, and until their return Creighton expects no respite from the hurly-burly of contracting. During odd moments he is working on a book tentatively called "Forty Years of Construction", a prosaic title which fails to do justice to the manuscript. Part autobiography, it is a rollicking account of a contractor, with a sense of humor, who has led a full life during which he has received many impressions of people and events, and who is also highly articulate and capable of setting down these impressions in print. For construction men, an interesting feature of this work will be an appendix with records of costs on some of the early construction projects of the Foster & Creighton Co.

Concrete Research Needed

Regarding research, Creighton is particularly interested in concrete structures throughout the country which he feels are failing much sooner than they should. "I think the cement associations should consult with the contractors who built these structures that are not lasting, and find out what methods of construction were used so that more light can be thrown on the durability of concrete. Take the Sparkman Street bridge here in Nashville which at 3,000 feet was the longest concrete viaduct in the world when we built it in 1907. Tests of concrete during construction showed the material to be many times stronger than required, yet the concrete is spalling today. One interesting thing I noticed in the limestone quarry where we got our coarse aggregate is the wearing away of that quarry stone through weathering. If the stone will do that in the quarry, the same thing will happen in the bridge. "I think steel is put too near the surface in reinforced concrete," said Creighton. "I'm allergic to the use of too much steel in concrete and favor a minimum of steel and a maximum of concrete. A dowel bar is as bad as a stick of dynamite sometimes. Concrete should thoroughly protect the steel from the weather, and when chemists discover something to keep water from penetrating the surface, the problem of disintegrating concrete will be lessened."

Disliked New Deal

Wilbur Creighton has been no admirer of the New Deal. However, he has a lot of respect for Harold Ickes, considers him honest, efficient, and capable.

"Despite all opposition from the Administration, I am confident that business will survive," said Creighton. "The prosperity of this country depends on the thousands upon thousands of little business men who are really white-collar workers with respect to income. They should get an income somewhat in keeping with the scale of wages paid to union labor who have been the favorites of the New Deal Administration."

"I expect an energetic post-war competitive market, leading up to a big boom, and then the damndest depression the world has ever seen. The only difference between this depression and the one following the last war will be in degree. You don't have to be an economist to know that you cannot carry on a war, which is the greatest waste of lives and raw materials, without having to pay for that waste. The public does not yet realize what we shall have to pay."

Wilbur Creighton's pleasant face looked stern for a moment and then relaxed. The business day was nearly over in the 6-room suite of offices oc-

cupied by Foster & Creighton Co. in the American National Bank Building, and the office staff was preparing to leave. Its President was also ready to go.

"I don't think I'll work on 'Forty Years of Construction' tonight," said Creighton. Then with a smile, "I'm reading 'Forever Amber' and I can't be distracted."

Bolt and Nut Co. Joins Barium Steel Corp. Group

Through its wholly owned subsidiary, the Clyde Iron Works, Inc., Duluth, Minn., the Barium Steel Corp. has acquired control of the Erie Bolt & Nut Co. of Erie, Pa. This acquisition is another step in the post-war program of

Barium Steel to broaden its activities in correlated lines of production.

The Erie Bolt & Nut Co. manufactures special bolts, studs, and related products for use in a variety of machinery, including construction equipment. Through the Barium and Clyde organizations, the demand on Erie will be augmented considerably.

GOODALL HOSE AND BELTING

...Made to Stay ON THE JOB Longer!



AIR HOSE...

A type for every ordinary or heavy-duty job, above ground or below, in both moulded-and-braided and wrapped duck constructions. Some are all Synplastic. "Subway," "Mine King," "Oil King" and "Allgood Cord" are among the leaders in the line.

STEAM HOSE...

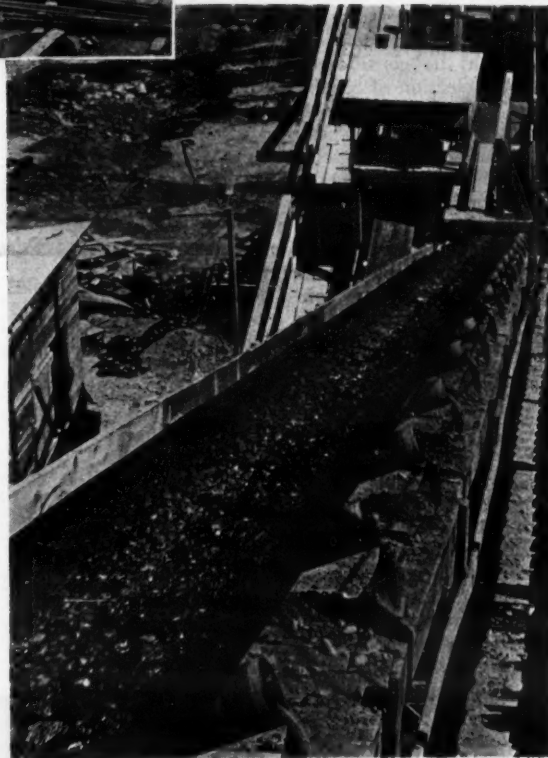
"Inferno," "Judson" and "76" are familiar names to users of steam hose for pile-driving and all other applications, at maximum temperatures and pressures.

WATER HOSE...

Contractors know "Roadbuilders" for its long service record on pavers, mixers and other heavy-duty equipment. "Buckskin" is equally well-known for its reliability and economy on the regular water hose jobs.

CONVEYOR BELTING...

"Triple-S": For long, heavy hauls on trap rock, crushed limestone up to 8", rough slag, hot materials, etc. "Goodall": For conveying lighter materials such as crushed stone, gravel, ashes, shells, etc. Both are backed by the Goodall guarantee of reliable, economical service.



GOODALL BOOTS and CLOTHING

A complete line of boots, shoes, coats, shaft suits, hats and gloves for protection from rough work and wet weather. Contact our nearest branch or main office for details and prices:



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Philadelphia • Trenton • New York • Chicago

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Factory—Trenton, N. J.

Established 1870



SUPER

Like that of the B-29, Owen superiority is based upon a thorough knowledge of the problem, expert designing and precision manufacturing from the most appropriate materials available.

The OWEN BUCKET Co.

6030 Breakwater Avenue, Cleveland, Ohio

Branches: New York Philadelphia Chicago Berkeley, Cal.

OWEN BUCKETS

A MOUTHFUL AT EVERY BITE



Secondary Systems Under New F-A Bill

Routes May Be Transferred From Primary to Secondary; Progressive Selection Is Urged by Washington

IN the recent instruction issued by the Public Roads Administration on the selection of the Federal-Aid secondary system under the Federal-Aid Highway Act of 1944, great stress is laid upon careful integration of the primary and secondary Federal-Aid systems and the progressive selection of the secondary systems, bearing in mind the limits of funds that will become available in the foreseeable future.

The objective of the specific provisions of the Act with respect to secondary roads is considered to be a more comprehensive rural-road program through the selection and improvement of a system of principal secondary or feeder roads supplementing the Federal-Aid highway system in rural areas, so that together they will form an integrated network in which the two systems complement each other as trunk-line and feeder routes.

If a proper allocation of rural trunk lines and feeders is to result, it is desirable for highway officials to review, and modify as necessary, the Federal-Aid highway system before undertaking what might be considered a final or complete selection of secondary routes. Routes included in the Federal-Aid highway system which perform a secondary or feeder service can now be adequately provided for in the Federal-Aid secondary system and should be transferred to that system. An advantageous result of such transfers is that mileage thus eliminated from the Federal-Aid highway system becomes available for the inclusion of inter-city rural routes and arterial distributing routes in urban areas without exceeding the legal limitation on the total extent of the system.

An important reason for proceeding cautiously in the selection of a complete secondary system is the provision of Section 1.4 of the Regulations that the extent of the overall mileage of the several systems shall be a mileage which can be brought to a state of adequate improvement within a reasonable period of years, and which can be maintained, and reconstructed as required, with the estimated income that will be available from all sources for these purposes. Such a determination is by no means a simple problem. It will require skillful use of facts and techniques developed by the highway planning surveys, and probably will be the result of several successive approximations. It will also require review and revision from time to time thereafter.

It is suggested, therefore, that the Federal-Aid secondary system in each state be selected and submitted for approval in progressive stages.

Roads Eligible

The term "secondary and feeder roads" means roads in rural areas, including farm-to-market roads, rural mail routes, and school-bus routes, but is not limited to roads of these specific descriptions. The term "rural areas" means all areas not included within the urban areas delimited about municipalities of 5,000 or more population. The term "secondary and feeder roads", therefore, includes appropriate streets within those municipalities of less than 5,000 population which are not included within urban areas. The definition does not exclude roads which are parts of the state highway system. Any road located in "rural areas" as defined, which is not included in the Federal-

Aid highway system, may be considered as complying with the definition.

The funds authorized by the Act for secondary and feeder roads, however, are available for expenditure only on principal secondary and feeder roads and on a system of such roads selected by the state highway departments in cooperation with county supervisors, county commissioners, or other appropriate local road officials, and the Commissioner of Public Roads. The term "other appropriate local road officials" is construed to include the appropriate officials of the municipalities in which Federal funds may be expended on routes of the system to be selected.

The requirement for cooperation with local road officials in the selection of the system is considered a basic re-

quirement of the Act, applicable in every state to the initial selection of the system and to all extensions and modifications thereafter, and is not modified or waived by any other provision of the Act. In a county or other political subdivision of a state in which all public roads and highways are under the control and supervision of the state highway department, that department may be considered the local road

authority, and cooperation with other local authorities of such political subdivision is not required. The manner or method of cooperation with the local road officials shall be determined and exercised by each state highway department.

The cooperation of the Commissioner of Public Roads will take the customary form of review and approval of the

(Continued on next page)

Another Big Year--For



ALL TYPES AND SIZES

DAVENPORT-FRINK SNO-PLOWS

All indications are that the demand for the engineer-preferred, lighter yet stronger, faster and safer Davenport-Frink Sno-Plows will exceed all previous records. That's why we suggest to you—Check over your equipment NOW—and get your orders placed for the next snow season. We'll cooperate with you in every way.

Complete Information on Request

DAVENPORT BESLER CORPORATION

Made in Eastern U.S.A. by CARL H. FRINK.

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DAVENPORT, IOWA
1000 Islands, CLAYTON, NEW YORK

POWER for Great Projects



Great construction projects await final victory. There are airports, state and federal highways, bridges, dams to build. There are vast flood control, land clearing, and housing plans to be activated. All will require power of the kind that has made the name International famous.

Think now of International Power—TracTractors, Wheel Tractors, and Power Units—in relation to your postwar plans. These tractors and power units, designed and built by International Harvester, come with both Diesel and carburetor-type en-

gines and in sizes adapting them to a multiplicity of jobs. Into their design and construction goes the know-how that has made International Harvester the world's leading tractor producer.

Although civilian supplies are limited, now is the time to plan your postwar power set-up. Let the International Industrial Power distributor help you. He has the power that will be most useful and economical for you. And his service facilities are tops!

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

INTERNATIONAL POWER



"Dammit, Morgan, don't come running to me with your troubles!"

Secondary Roads

(Continued from preceding page)

system submitted by the state highway department for formal action. Field personnel of the Public Roads Administration will be available to assist the state highway department in studies leading to the selection of the system.

In the states of Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania, in the District of Columbia, and in Puerto Rico, all of which have a population density exceeding 200 per square mile, the state highway departments, in cooperation with the appropriate local road officials and with the approval of the Commissioner of Public Roads, may select the system without regard to municipal boundaries.

In the states of Delaware, West Virginia, and North Carolina, and in the District of Columbia and Puerto Rico, these being the only "states" in which all public roads and highways are under the control of the state highway department, a system of principal secondary or feeder roads must be selected in accordance with the general requirements of the Act; but the funds apportioned to these states for projects on secondary or feeder roads may be expended for projects on the Federal-Aid highway system, if, and to the extent that, the state highway department and the Commissioner of Public Roads jointly agree that such funds are not needed for use on the system of principal secondary and feeder roads selected.

Integration and Selection

In order to meet the general requirements for integration with the Federal-Aid highway system, routes selected for inclusion in the Federal-Aid secondary system should connect at least at one end with a Federal-Aid highway route, either directly or through other Federal-Aid secondary routes. In many cases, it will be necessary to effect such connection and integration of the Federal-Aid secondary system with the Federal-Aid highway system by means of designated portions of routes which fall inside the boundaries of urban areas, even though such portions may be ineligible for improvement with Federal-Aid secondary-road funds.

Transfers Between Systems

In accordance with the provisions of Regulation 1.4, when conditions warrant, transfers of routes may be made between the Federal-Aid highway system and the Federal-Aid secondary system. In the previous designations of Federal-Aid secondary-road systems, it has been the practice to omit certain routes as potential future additions to the Federal-Aid highway system. In view of the provisions of Regulation 1.4, there generally will be no occasion to reserve mileage for future additions to the Federal-Aid highway system. Furthermore, the probable relative financial provision for the two Federal-Aid highway systems in the future and the expected need of more costly improvements of the trunk-line Federal-Aid highway system suggest the advisability

of holding the latter system within relatively low percentage limits.

Selection Procedure

Criteria and methods previously followed in the selection of a Federal-Aid secondary system are suggested as guides to the present selection of the Federal-Aid secondary system. Using such criteria and methods, the state highway departments, in cooperation with county supervisors, county commissioners, municipal authorities, or other local road officials concerned in each county, should select and submit an initial stage of the system as promptly as possible for consideration and approval by the Commissioner of Public Roads. It is not necessary that the first submission include mileage in every county in the state; it may comprise any substantial number of counties in which the concurrence of local officials has been obtained. The initial stage should thereafter be completed without undue delay by one or more submissions.

(Concluded on next page)

What
YOU SHOULD
KNOW ABOUT

- 1 Portable units operate through powerful air stream by an effective double separation principle. No dust escapes into the air. Reduces SILICOSIS hazard to safe hygienic limit.
- 2 When applied to rock drills, SPEEDS UP DRILLING TO 33 PERCENT. Drill steel cuts into fresh rock unimpeded by dust or chips. PROLONGS LIFE OF DRILL STEEL. REDUCES SHARPENING COSTS.
- 3 Quick detachable hood permits easy inspection of hole and changing drill steel without interference from hood.
- 4 When applied as industrial unit, collects dust accumulations that are costly and apt to be a hazard both to men and equipment. Keeps your plant, motors and machinery free from harmful dusts.
- 5 Equipped with Markley-Carter disposal container which permits continuous collection and disposal without closing down the system.

MARKLEY-CARTER Portable DUST COLLECTORS "Collects and Controls"

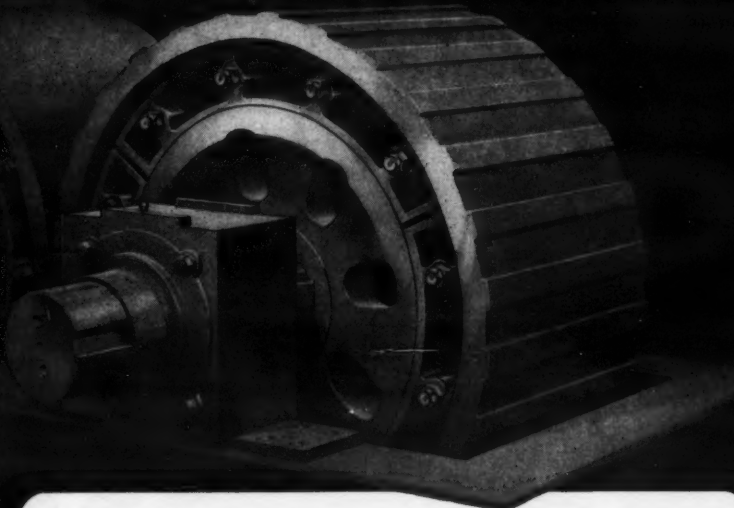


Model
IWD

Write for Bulletin 4402 which describes in detail the advantages of using MARKLEY-CARTER DUST COLLECTOR in your quarry and plant.

RALPH B. CARTER COMPANY
192 ATLANTIC ST., HACKENSACK, N. J. 53 PARK PL., N. Y. 7, N. Y.

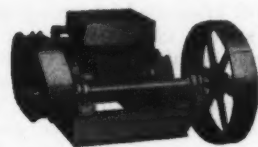
On Fine Reduction Crushing
*Up to 8 times
more production*
with Pioneer Roll Crushers



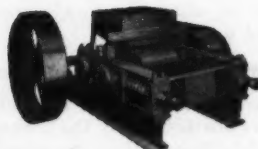
● To lower the costs of secondary crushing still further, more and more operators are installing Pioneer Roll Crushers because they deliver more on every score. They deliver small materials, in large quantities, at high speeds and at low production costs.

Power cost per yard of output is much lower than that of any other type of crushing. It is estimated that you get up to 8 times more production from your investment in manganese crushing surface when you use roll crushers because 100% of the shell area is at work and producing, and the wear is evenly distributed over the entire surface of the shell. Compare this to other types of crushers where only 10% to 20% of the manganese surface does all the work, all the fast wearing out.

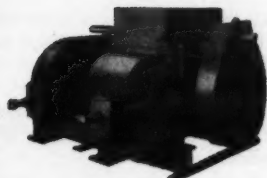
What other operators are doing with Pioneer Roll Crushers is information that interests every man considering secondary crushing. We'll be glad to place these records before you—give you the benefits of Pioneer's experience in selecting roll crushers that fit your needs completely.



Pioneer 16" x 16"



Pioneer 24" x 16"



Pioneer 30" x 18"



Pioneer 40" x 22"



Pioneer 54" x 24"

Plan with Pioneer
FOR PROFITABLE PRODUCTION

Pioneer

ENGINEERING WORKS

Jaw Crushers, Roll Crushers, Screens, Conveyors, Piers, Washers
MINNEAPOLIS 12, MINNESOTA

ENGINEERS
AND
MANUFACTURERS
OF QUARRY
GRAVEL AND
MINING
MACHINERY

Secondary Roads

(Continued from preceding page)

sions for the remaining counties of the state. In order to provide for the obligation of Federal-Aid secondary-road funds authorized for the three post-war years, it is desirable that the initial stage of the system be selected and approved as promptly as possible and that the mileage thereof be sufficient to provide considerable latitude in the selection of projects.

It is contemplated that, in those states where a substantial mileage of the Federal-Aid secondary system has previously been approved, a review of the system with local road officials should generally result in its adoption, possibly with some modifications, as the initial stage of the new Federal-Aid secondary system.

During the time construction is in progress on routes included in the first stage of the system, it is expected that the state highway departments will complete a comprehensive analysis to determine the ultimate extent of the several integrated systems that can be maintained, constructed, and reconstructed within the limits of the funds that can be anticipated as available in the foreseeable future. As a result of this analysis, it should be possible to include in the second stage the final selection of routes that will complete each of the systems. Modifications of any system or transfers between systems can, of course, be made at later dates as changing conditions in the future warrant.

Maps and Supporting Papers

The following maps and supporting papers are desired by the Commissioner of Public Roads when the state highway departments submit their selections of secondary routes:

1. A map of the state to convenient scale and a set of planning-survey county maps showing traffic-flow data, on which should be indicated the Federal-Aid highway system and the proposed Federal-Aid secondary routes with assigned route numbers. These maps will be retained in the Washington office.

2. A tabulation of the selected system, in triplicate, prepared on standard letter-size paper, giving the Federal-Aid secondary-route number, the state or local route number, a brief description of the route and its termini, the county or counties in which it is located, the mileage on the state highway system, the mileage on the local system, and the total length of the route. Two copies of the tabulation will be retained in the Washington office and one approved copy will be returned to the state through the PRA Division Office.

3. An explanation of the methods and criteria employed in the selection of routes.

4. An explanation of the manner in which the cooperation of local road officials has been sought and obtained, and a statement as to their concurrence in the roads selected.

These maps and supporting papers should be submitted by the state highway department through the Public Roads Administration Division Engineer, who will forward them, with his comments and recommendations, for consideration by the Commissioner of Public Roads.

New Dealers Appointed

By Richmond Screw Anchor

The Richmond Screw Anchor Co., Inc., Brooklyn, N. Y., manufacturer of construction devices for concrete forms, has announced the appointment of the following new sales agents in widely spread sections of the country: Concrete Supply & Steel Co., 122 No. Cali-

fornia Ave., Atlantic City, N. J.; Lewis & Coulter, 209 Barbeau St., Pittsburgh, Pa.; H. P. Weller Supply Co., Erie, Pa.; The W. M. Pattison Supply Co., 777 Rockwell Ave., Cleveland 14, Ohio; Allied Construction & Equipment Co., 4025 Forest Park Ave., St. Louis 8, Mo.; Earle Equipment Co., 6331-51 Tireman Ave., Detroit 4, Mich.; W. H. Hobbs Supply Co., Eau Claire, Wis.; Roth Building Supply Co., P. O. Box 290, Sheboygan, Wis.; Olson Equipment Co., 2940 Blaisdell Ave. So., Minneapolis 8, Minn.; Moss Engineering Co., 204 Standard Bldg., Fort Wayne 2, Ind.; Blue Diamond Co., Inc., 230 So. 31st St., Birmingham, Ala.; Burton Bros., Inc., Merchants National Bank Bldg., Mobile, Ala.; Choctaw Culvert & Machinery Co., P. O. Box 2057, DeSoto Station, Memphis, Tenn.; Fletcher Equipment & Supply Co., 609 Tchoupitoulas St., New Orleans, La.; Smith Equipment Co., Columbia, S. C.; and Wilson Machinery & Supply Co., 131 No. Mills St., Lexington, Ky.

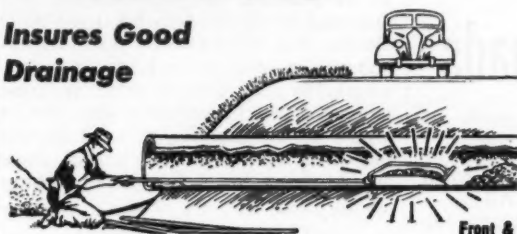
The following agents were appointed

in the west and southwestern states: Interstate Machinery & Supply Co., 1006 Douglas St., Omaha 8, Nebr.; Stroup Hardware Co., Billings, Mont.; Townsco Equipment Co., 1700-1708 N. W. Sixth St., Oklahoma City, Okla.; Waterloo Steel & Equipment Co., 524 Park Road, Waterloo, Iowa; R. J. DeWees, Burt Bldg., Dallas 1, Texas; and the Richards Equipment Co., 325 Washington St., Waco, Texas.

Outside the United States the following were named: Anahuac Machinery Co., S. A., Bucareli No. 12, Apartado 2041, Mexico City, D. F.; Shanahan's Limited, P. O. Box 280, Vancouver, B. C., Canada; The A. R. Williams Machinery Co. of Vancouver, Ltd., 405 Grain Exchange Bldg., Calgary, Alberta, Canada; and Charles P. Roper, General Trust Bldg., Halifax, Nova Scotia.

MORCO CULVERT CLEANER

Insures Good Drainage



Restore clogged culvert pipes to service with the "Morco" Culvert Cleaner. Quick-acting, non-damaging, easy operating "Morco" is the most satisfactory tool yet developed for this work.

MONARCH ROAD MACHINERY COMPANY

Front & Douglas N. W., Grand Rapids 4, Michigan

How Bethlehem serves HIGHWAY BUILDERS



REINFORCING STEEL—Bethlehem Bar Mats, made of deformed bars clipped together, are easy and convenient to install, and lie flat.

HIGHWAY GUARD—Bethlehem's beam-type guard rail, called the Safety-Beam, is made in standard 12 ft., 6 in. lengths, or can be supplied in lengths up to 50 ft.

THERE'LL be a great army at work—perhaps as many as 7,000,000 men—when postwar highway and bridge building gets under way.

Your district will have its part in this big, constructive peacetime push. You may have already figured out your manpower needs, and how your logistics—the fine art of keeping supplies moving to the front—will work out.

Make Bethlehem the G.H.Q. for your road and bridge steel needs. Bethlehem can supply every one of the many steel items needed to build a modern concrete highway, and bridges. There's a Bethlehem warehouse near you, and all you'll need to do to get your complete road steel order moving fast is to put in a telephone call.

For full information get in touch with the nearest Bethlehem district office, or write direct to Bethlehem Steel Company, Bethlehem, Pa.



BETHLEHEM PRODUCTS FOR HIGHWAYS

Road Joints • Center Strip • Dowels
Dowel Bar Supports • Reinforcing Bars
Bar Mats • Bar Ties • Reinforcing for
Concrete Pipe • Bridge Floor Reinforcing
• Concrete Slab Spacers • Welded
Wire Fabric • Guard Rails • Guard
Posts and Brackets • Wire Rope and
Strand • Right-of-Way Fence and Posts
Anchor Rods • Pipe • Hollow Drill Steel
Digging Bars • Structural Steel • Metal
Boards • Corrugated Sheets • Turn-
buckles • Tie Rods, Spikes, Bolts
and Nuts • Timber Bridge Hardware
Sheet and H-Bearing Piling



C. V. Mills of Carthage, Miss., cuts the ditch and shoulder slopes on his patrol section on Miss. 49 near Yazoo City, using a pneumatic-tired power grader.

Rubber-Tired Units Maintain Our Roads

Road maintenance and major repairs to shoulders of highways continue in wartime as well as in peace, because of the vital role being played by motor transportation in the moving of essential civilian and military supplies. Erosion may cause thousands of dollars' damage to highways unless constantly kept under control. Highway maintenance men find motorized equipment with rubber tires especially helpful in the proper grading and repair of shoulders along the right-of-way.

Typical of these operations is the major repair of shoulders as shown above, 6 miles south of Yazoo City on Mississippi State Highway 49, where a Caterpillar No. 12 grader equipped with Goodyear Sure Grip grader tires on the four power wheels and Rib Grader tires on the front wheels is in use.

Adequate Fire Protection

For Electrical Apparatus

Although electricity is not, when properly used, a fire hazard, there is always the possibility that accidents or mishandling will cause one. Therefore all electrical apparatus should be protected by the correct type of fire extinguisher. Portable vaporizing-liquid or carbon-dioxide extinguishers are best suited for this purpose, as they

do not cause shock to the operator, short circuits, or damage when used on live equipment. This type is also effective in case of fire in the oil used in transformers, circuit breakers, and similar devices.

One large or two small extinguishers, bearing the approval of the Underwriters' or Factory Mutual Laboratories, should be placed near each small open or semi-enclosed rotating unit, switch, appliance, or other commonly used electrical device. Large motors, generators, and switchboards require more units. In all cases the extinguisher should be located near, but not on, the equipment to be protected and in a position where it will not be cut off by a fire.

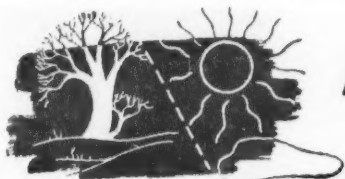
The application of vaporizing liquid or carbon dioxide and cutting off the current will usually subdue most small electrical fires. If the fire persists in spite of the application of extinguishants, water may be used, but water should not, under any circumstances, be used on live apparatus.

A danger to be remembered is the fact that burning insulation generates poisonous gases. Workers should be instructed always to use a gas mask when fighting an electrically caused fire in an enclosed place, or, if that protection is not available, to stay outside the enclosure wherever possible. If this is not possible, they should leave as soon as the fire is out and not return until all smoke and odors are gone.

Bitucote Co. Provides Eastern Representation

Edward J. Blanchfield, 50 Mt. Vernon St., Cambridge 40, Mass., has been appointed manufacturer's agent in New England by the Bitucote Products Co., St. Louis, Mo., for its line of asphalt emulsions, paint and coatings, and asphalt paving products for highway construction and maintenance. The Collins Oil & Mfg. Co., 90 West St., New York City, has been made Bitucote sales representative in the Greater New York area.

discharge non-conducting agents that



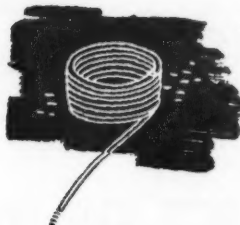
ALL-WEATHER OPERATION...



AT ANY ALTITUDE...



WITH LESS OIL CONSUMPTION



AND LONGER HOSE LIFE

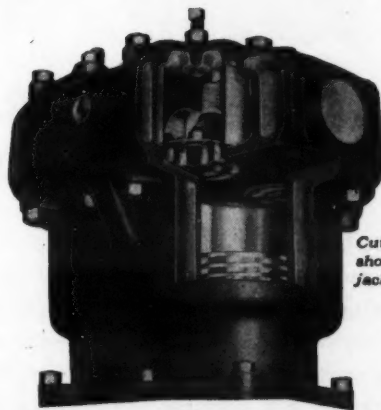
WITH

"ALL WATER-COOLED" TWO-STAGE PORTABLES!

Water-cooling does it better! That's the secret of the exceptional operating efficiency of Gardner-Denver "all water-cooled" Two-Stage Portable Compressors. Hot weather... cold weather, high altitudes... low altitudes—they're all the same to these "weather-conditioned" portables.

Water-cooling does more! It assures cooler discharge temperatures... less wear and tear on valuable air hoses... cuts lubrication costs. The completely water-jacketed heads and cylinders of a Gardner-Denver Portable are your assurance of better performance in any kind of weather, at any altitude, under all types of operating conditions.

For complete information on "all water-cooled" portables, write for descriptive bulletin. Gardner-Denver Company, Quincy, Illinois.



Cutaway of cylinder showing water jacketing



GARDNER-DENVER Since 1859

CUMMER ASPHALT PLANTS

EIGHT SIZES

Up to 1000 Tons per day

DRYERS

Two-Fire and Internal
Fire

30 to 100 Tons per hour

Electric Batch Timers

50 Years' Experience

THE F. D. CUMMER & SON CO.

EAST 17th & EUCLID
CLEVELAND 15, OHIO

Captured Nazi Goods Aid to Allied Armies

The rich industrial Rhineland and Saar Valley have proved gold mines of captured Nazi war materials which are now being put to good use by the occupying armies. This represents a tremendous saving in money and goes a long way in solving the vexatious problems of man-power and shipping space. In the Saar Valley alone, huge stockpiles of steel, estimated at several million tons, have been uncovered, as well as quantities of prefabricated steel-truss bridges, road graders, locomotives and box cars, trucks, automobiles, hand tools and other equally valuable equipment.

Lieutenant Colonel Charles C. Redman, Jr., of Kennett, Mo., is commanding officer of the engineering units which are rounding up this material and putting it to work. In reporting on the situation, he said, "We have uncovered enough material to practically live off the land. While I was serving with

the Army's Internal Security Control in 1941 it was my job to inventory war plants and warehouses on the west coast of America. We did not have stockpiles then comparable to present Nazi supplies uncovered here to date.

"The Germans could have carried on the war indefinitely with the equipment and manufacturing facilities we have found in the Saar Valley. It is apparent that every German home, garage, and barn was a potential warehouse or war factory. Huge quantities of materials have been uncovered in the basements of private homes, and complete factories tooled to turn out munitions, arms, and vehicle parts have been found in isolated livestock barns.

"I was amazed at the tremendous amount of steel the Germans had stockpiled in this area. This steel, along with the huge supplies of lumber, cement, and other building materials we have found, makes it apparent that the Germans have enough on hand to pursue a good post-war construction program."

Many factories have been put back

in operation. The world-famous chemical works of I. G. Farben Co., located in the Saar Valley, has been taken over for military use by Com Z Engineers and is now producing supplies for the U. S. Army. About 4,000 German workers are employed in the giant plant which stretches for several miles along the banks of the Rhine at Ludwigshafen. Although about 65 per cent of its buildings were destroyed by Allied bombing, only 30 per cent of the operating machinery was lost, according to the plant's German directors.

So now German civilians working in these plants are turning out a volume of necessary supplies for the Allies. Oxygen for welding is the first item on the list, and it is now being produced at the rate of 1,000 cylinders a day. Production of acetylene will begin shortly, and many other products and raw materials are available and will be developed according to military needs to meet the problems of occupation.

At Rheinhausen 600 railroad cars of captured supplies were brought in for

the construction of a 3,300-foot railroad bridge. Some of the parts were made in the Krupp Steel Works at Rheinhhausen, where Engineers found the necessary materials for the fabrication of the steel beams for the bridge. Colonel Redman commented, "There is almost enough to rehabilitate some of the countries they have devastated."



adeco...

NOZZLE TESTER Keeps Diesel Engines Running Efficiently

To keep diesel engines operating at peak efficiency, this portable, precision-built Adeco Nozzle Tester is indispensable.

Light in weight yet built for heavy-duty service, it enables any mechanic to make quick accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p.s.i. Prevents costly delays and possible damage to engine.

Ideal for testing hydraulic devices.

Write for bulletin on this practical, low-cost unit.



TESTS FUEL INJECTORS
AND HYDRAULIC DEVICES
at Pressures up to 10,000 p.s.i.



AIRCRAFT & DIESEL
EQUIPMENT CORP.

DEPT. 9: 4411 N. RAVENSWOOD AVE.
CHICAGO 40, ILLINOIS

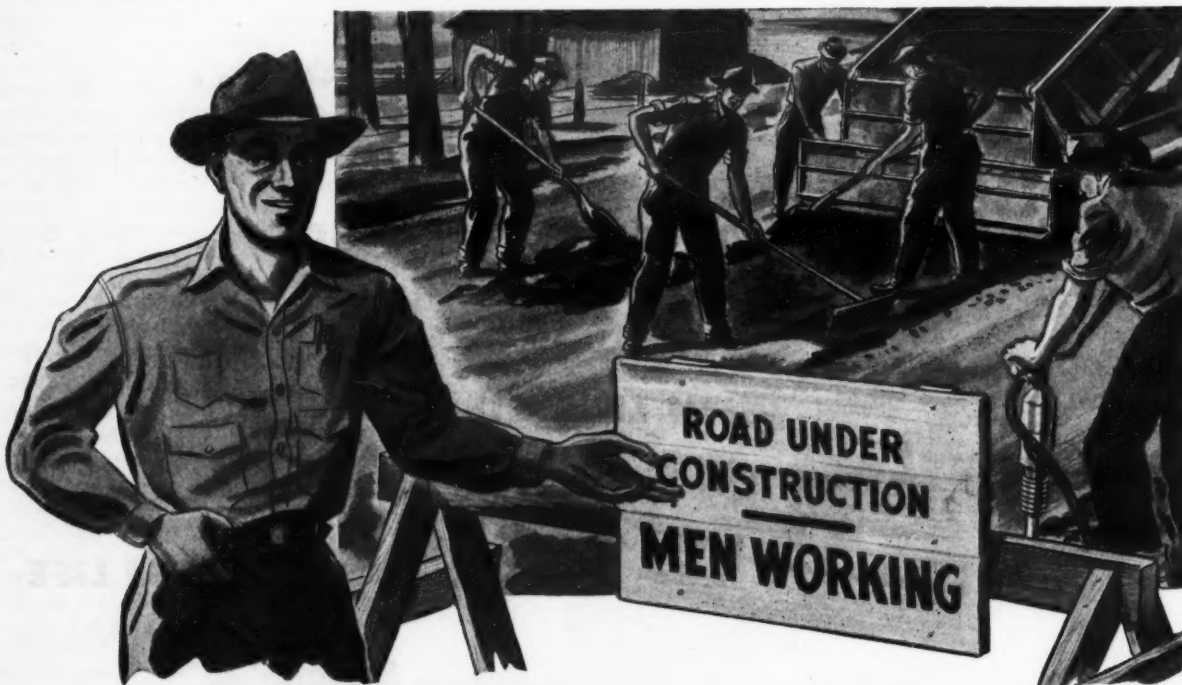
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Victory Is Never Cheap
in Lives
or Money!

They're giving their all

Back them up
with your Dollars
by Buying War Bonds!

Buy Now—Buy More—MORE!



HOW MANY OF THESE SIGNS WILL THERE BE IN YOUR COUNTY?

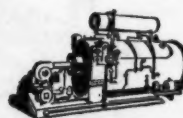
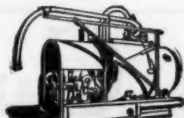
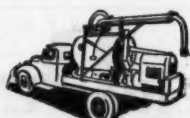
YOUR city, county and state can do its part in providing employment for returning veterans—can stand to gain modern highways, roads and streets—can share in a prosperous postwar future—by its co-operation in a national program for highway construction and rehabilitation.

The Federal Government has already appropriated 1½ billion dollars for this postwar project for employment and progress. By matching the Federal funds allocated, every state or municipality can directly share in the benefits of this sound program.

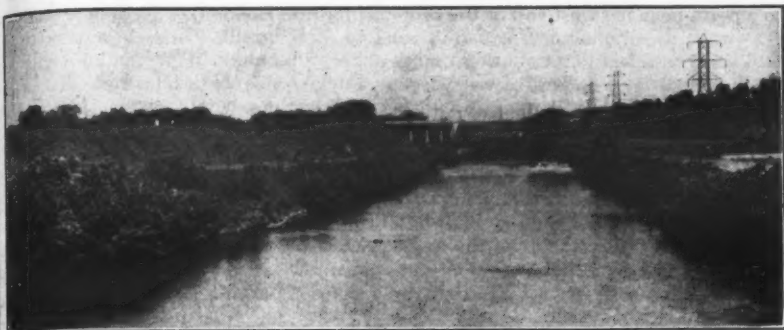
CLEAVER-BROOKS COMPANY, 5110 N. 33rd Street, Milwaukee 9, Wisconsin

Cleaver-Brooks

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS



"The Road Ahead," a booklet published by the American Road Builders Association, 1319 F St., N.W., Washington, D.C., presents this national postwar project and its benefits in detail—write for your free copy.



Willow and poplar growth along the banks of the Cuyahoga River resulting from bank protection with mats of branches. (See page 41).

Equipment Cleaning Aid to Maintenance

The first step in the inspection and overhauling of construction and maintenance equipment used by contractors and state and county highway departments must be cleaning, to remove dirt and grease in order to see the extent of needed repairs, while the regular cleaning of parts is essential to efficient operation of machines. Two models of equipment-parts cleaners are made by the Practical Products Co., 2632 Nicollet Ave., Minneapolis 8, Minn., to provide speedy, efficient and safe removal of oil, grease, and dirt.

The Kleeer-Flo 30 electrically operated mechanical parts cleaner offers a deep working space for handling large or small parts, small electric motors, or other small assemblies up to 300 pounds. Its tank requires a maximum of 20 gallons of cleaning compound, and it has a soaking tank with 10-gallon additional capacity. The unit consists of a rigid all-steel welded cabinet, with a 12-inch-depth working compartment and sliding shelves, resting on a 16 and 18-gage-steel base constructed to relieve the cabinet of all strain. The pump is in a cast-iron housing and ejects all heavy dirt from the fluid before it reaches the filter, which is readily accessible and has a low-cost replaceable element. Power is furnished by a 110-volt 60-cycle ac motor, with 50-cycle and 220-volt units available. The hose is of an exclusive Kleeer-Flo design, of polished steel wire, spring-wound, which may be placed in any position, relieving the operator of holding it. The floor space required for the complete unit is 24 x 36 inches. Accessories available for the Kleeer-Flo 30 include a soaking tank, a drying shelf, and baskets for holding small parts.

The other model is the Kleeer-Flo agitating power parts cleaner for any type of cold washing. A vertical stroke of 4½ inches fifty-eight times a minute creates a washing pressure for the removal of all oil, chips, grit, and other foreign materials. This unit requires 29 x 34 inches of floor space, and has a 22-inch-deep tank. Power is supplied by a ¼-hp single-phase ac 110-220-volt 60-cycle motor as standard, although other types of motors are available. Baskets, additional shelves, and similar accessories are also available at slight extra cost.

Further information on these Kleeer-Flo equipment-parts cleaners and their use in equipment shops is contained in literature which may be secured direct from the manufacturer. Just mention this item.

Recognition of Efforts

In Production for War

Announcement has been made by the Barco Mfg. Co., Chicago, Ill., that it has been granted an "Approved Quality Control Rating" by the Army Air Forces for outstanding quality, inspection procedure, and control. In addition to aviation devices for the Air Forces, many of them for our B-29's, Barco manufactures gasoline hammers, flexible ball joints, and other steam, air, and hydraulic specialties.

A renewal of its Army-Navy "E"

Award for outstanding performance in war work has been given the Babcock & Wilcox Co., Bayonne, N. J., manufacturer of steam-generating equipment. Most of this company's war work at Bayonne has been the production of marine boilers.

Baker Mfg. Co., Springfield, Ill., has been awarded a third star for its Army-Navy "E" pennant. In addition to the

production of bulldozers, a less publicized though important contribution of this company has been the large number of snow plows for military posts and ordnance depots in northern latitudes.

A fifth Army-Navy "E" Award has been made to the Continental Rubber Works, Erie, Pa., for maintenance of its high standards in turning out rubber products for the Army, Navy, Air Force, and Chemical Warfare Service.

Davenport-Besler Corp., Davenport, Iowa, manufacturer of snow plows, blades, locomotives, and other heavy-duty equipment, has received a third renewal of its Army-Navy "E" Award.

Announcement has been made by Davey Compressor Co., Kent, Ohio, that, in addition to receiving its third Army-Navy "E" star, fourteen members of the organization have been presented with certificates of merit from the Offices of Scientific Research and Development for their contribution to the development and manufacture of war items. This company is making its

regular line of portable and industrial compressors, portable electric units, power take-offs, and pneumatic saws, as well as several special units, for the armed forces.


Independent Pneumatic Tool Co., Chicago, Ill., manufacturer of Thor portable pneumatic and electric tools, has received the fourth renewal of its Army-Navy "E" which was first presented to that company in October, 1943.

For outstanding production of engines essential to the war effort, a fourth Army-Navy "E" has been awarded to Kiekhaefer Corp., Cedarburg, Wis.

Mall Tool Co., Chicago, Ill., has been given a fourth renewal of its Army-Navy "E". This company makes drills, saws, concrete vibrators, and similar equipment.

The first five-star "E" pennant in the Kansas City, Mo., area is flying over the plant of the Union Wire Rope Corp., for its consistent achievements in war production for the armed forces.

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OTHER PRODUCTS OF GAR WOOD INDUSTRIES INCLUDE HOISTS AND BODIES • WINCHES AND CRANES • TANKS • HEATING EQUIPMENT • MOTOR BOATS

New Retread Top

(Continued from page 1)

this figure with any consistency, which accounts for the delay of the project. As this road is the main highway between the Naval Air Base at Pensacola and the Army Airfield at Eglin, near Valparaiso, Fla., the contractor kept plugging at the road throughout the winter instead of waiting for warmer weather more favorable for this type of construction.

Low-Cost Material

The sand used in this retread is a native material found in great quantities in Florida and the Gulf coastal plain, but it is not the white seashore sand which is too fine and will not give the required 30-pound-per-square-inch bearing value. The sand must contain not more than 10 per cent clay, which does not mix freely with the asphalt, and must range in size from that passing a No. 4 to a No. 200 sieve. It is not limited to specific percentages passing definite sizes as long as there is a fair gradation of fines with the coarse grains. Four borrow pits, equally spaced over the 16-mile job and inland about 1,000 feet from the road, supplied a good grade of dark-colored sand at a shallow depth. Excavation was carried to a maximum depth of 4 feet by a Koehring dragline with a 30-foot boom and a 3/4-yard bucket, as the material was too hard and stiff to dig with a clamshell. The sand was hauled to the road by a fleet of ten Mack trucks of 5-yard capacity.

The 20-foot pavement, which required no preparation for the retread, has a 5-foot shoulder on each side. Stakes were placed along the shoulders at 20-foot intervals as markers for the trucks to dump. The sand was placed in piles at these points along one-half of the road so that traffic could be maintained on the other half. At this spacing, the sand averaged 1,300 cubic yards to the mile for a loose depth of 3 inches, and about 4,000 feet of road was covered with sand at a time.

Spreading With Blades

These piles were knocked down by an Adams grader with a 12-foot blade set at a 45-degree angle pulled by a Caterpillar Fifty tractor, a Caterpillar 66 grader with the same type of blade and pulled by a Caterpillar RD7 tractor,

and a Caterpillar No. 12 power grader also with a 12-foot blade. The sand was spread evenly over the full width of the 20-foot pavement so that the depth could be readily checked, and any roots or vegetable matter was removed. Then the graders bladed the sand to one side of the pavement, forming a windrow about 7 feet wide and 2 feet high in preparation for mixing with the asphalt.

A Wood Roadmixer with side cutter blades 8 feet apart was then pulled over the windrow by a Caterpillar D8 tractor at a speed of 16 2/3 feet per minute or 1,000 feet per hour, while a screw pulled the sand up into the 48-inch-diameter pugmill where it was mixed with emulsified asphalt at the rate of 2 gallons to the square yard. The pugmill was operated by a power take-off from the tractor engine. The treads on the tractor just cleared the sides of the windrow as it passed over.

The asphalt was purchased from the American Bitumuls Co. at Baton Rouge, La. Part of it was delivered by barge

to a point near the west end of the project, and the remainder by railroad tank cars to a rail point about 20 miles from the job and hauled in two Great Dane 8-wheel tank trailers of 4,315-gallon capacity each, pulled by Mack truck-tractors.

The asphalt was pumped from these large tanks into smaller relay tanks of 875-gallon capacity mounted on Mack trucks which followed behind the Wood traveling mixer and kept its 2,000-gallon tank filled with asphalt. On the rear of the Wood Roadmixer the contractor had mounted two 3-inch Roper pumps each driven by a Ford V-8 engine, one of which pumped the asphalt from the transfer truck into the tank on the mixer, while the other pumped the asphalt from the mixer tank to the pugmill. The 2,000-gallon tank on the mixer is also part of the contractor's redesign, and affords greater flexibility of operation by permitting the large-capacity trailer tanks to be used solely for hauling asphalt, for which they are essentially fitted, instead of traveling be-

hind the Roadmixer feeding asphalt into the pugmill. The lighter tank trucks keep this mixer tank supplied, with less interference to traffic than use of the big trailers would incur. About 4,000 gallons of asphalt was consumed per hour.

Mixed Material

The black mixed material was deposited behind the Roadmixer in a uniform windrow of about the same dimensions as before. Then the graders broke down the windrow and spread the sand-asphalt over the surface of the road in a 3-inch loose layer in order to dry out the water contained in the emulsified asphalt by aeration. The mix was left spread out for five or six days during which time traffic was permitted over the road.

The road was then ready to receive a tack coat, so the graders were brought back to push the material into a 4-foot-wide windrow along one side of the road while the other side was carefully

(Continued on next page)

WALTER 4-Point Positive Drive SNOW FIGHTERS

**CLEAR MORE SNOW
PER HOUR
AT LOWER COST!**



Walter 250 H.P. Snow Fighter, equipped with front V-Flow and right and left speed wings, clears a two-lane road in one round trip.

Walter 185 H.P. Snow Fighter, equipped with Offset V-Flow and Rotowing to handle heavy, drifting snow.

Walter 150 H.P. Snow Fighter equipped with One-Way Speed Flow and Levelling Wing for general snow conditions.

Walter Snow Fighter, with Pressure Center Scraper attachment, peels hard-packed snow and ice from pavement—fast and efficiently—without damage to pavement, truck or road surface.

Walter Snow Fighters are specifically designed and constructed for one, tough job—SNOW REMOVAL. Tremendous power-plus-traction supplied by the exclusive Walter Four-Point Positive Drive enables them to maintain speeds up to 30 m.p.h., clear widths up to 28 ft. on one run. Road-blocking drifts are speedily opened. Snow is removed before it packs and freezes into dangerous ruts. Main highways are completely widened-out. More miles of secondary roads are cleared.

Remarkable volume of snow removed per hour cuts costs by reducing the number of trucks needed to cover your routes. Fewer trucks to service means lower operating expenditures—takes a big load off garage facilities normally strained by winter breakdowns. Over a quarter-century of engineering for snow removal stands behind Walter Snow Fighters. Write today for literature describing their many exclusive features in detail.

WALTER 4-POINT POSITIVE DRIVE PROVIDES 100% TRACTION

This unique drive system uses three automatic locking differentials to proportion power to FOUR driving wheels, according to their traction at any instant. Should one, two—even three—wheels lose traction, the mates carry on. There is no slipping, no wheel-spinning, no stalling or bogging-down because power is sent only where it can best be used.

Additional features of the Walter Four-Point Positive Drive System include Suspended Double Reduction Drive for higher ground clearance, less unsprung weight, larger gear capacity, better protection of parts; tractor type transmission for extra power and ruggedness; cab-forward design for scientific weight distribution; oversize gasoline or diesel motors (125 h.p. to 300 h.p.) develop full power at moderate engine speeds.

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operate—get set for blades
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New Retread Top

(Continued from preceding page)

cleaned by a sweeper and blower, driven by a Wisconsin engine, mounted on a 4-wheel trailer. This cleaned side then received a tack coat of 0.2 gallon of RC-1S cut-back asphalt of 85 to 100-penetration per square yard, applied by a 657-gallon Etnyre distributor mounted on a Mack truck with a LeRoi engine to drive the pump. A 10-foot spray bar was used and the asphalt applied at 120 degrees. The cut-back for the tack coat and also for the seal coat was purchased from the Pan American Petroleum Corp. and hauled from storage tanks in Pensacola. Traffic was kept off the road during the spraying of the tack coat and about 4,000 feet was done at a time in order to minimize the number of joints. The graders then broke down the sand-asphalt windrow and pushed the material over on the tacked half-width of road, making a layer 10 feet wide and 6 inches deep. The other half of the road was then also cleaned by sweeping and blowing and covered with a similar tack coat, following which half of the material was pushed from the other side of the road to cover the fresh asphalt.

The entire surface was then worked over with a disk harrow, consisting of two rows of ten 18-inch disks, pulled by a Farmall rubber-tired tractor, so that the material consolidated easily. The mix was next compacted by a Bros 13-wheel wobble-roller, with six wheels in front and seven in back so they do not track each other, which was also pulled by a Farmall rubber-tired tractor. The power grader, on eight rubber tires, then went down the road, hard-blading the surface, in 5-foot lanes at a time, in order to give the surface the same crown as the existing pavement beneath. This hard-blading is done by dragging the blade over the surface to compress the sand-asphalt mix slightly. The entire surface was next rolled by a Buffalo-Springfield 5-ton tandem roller from the edges in towards the center.

Seal Coat and Edging

After traffic was permitted over the rolled surface for a 5-day period, the road was closed for a short time while the sweeper and blower thoroughly cleaned the surface of all loose material. Then the distributor, with the spray bar extended to the full width of the road, applied a seal coat of 0.25 gallon of RC-1S per square yard, which was covered with a light coating of sand taken from the shoulders of the road with hand shovels and scattered across the road surface. The road was then opened to traffic.

Although the plans called for but a 20-foot width of sand-bituminous retread, the contractor actually laid a width of 21 feet to allow for the material cut away during the edging which was done on a bevel. The tool used for this trimming was a circular colter, 22 inches in diameter and 1/2 inch thick, with its cutting edge ground to a sharp point. This revolved on an axle which was fastened at the center of the end of a power-grader blade. The colter had enough play on the axle so that it would cut at a 45-degree angle. A transit line was first run along the middle of the road and from this center line a chalk line, 10 feet 2 inches off center, was drawn on the pavement at each side. The colter was placed on this chalk line and the power grader operated along the road, cutting off 4 inches of paving first on one side and then the other. This made a 45-degree bevel at the edges, with a width on top of 20 feet of inches of sand-bituminous retread instead of the 20 feet required in the plans. The excess material was picked up by hand and loaded into trucks and

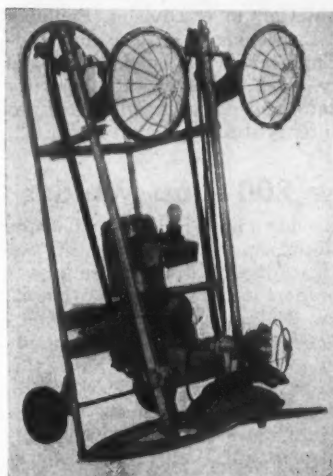
used by the State for patching material or building turnouts on the shoulders where it was placed and then smoothed by rolling.

Other Equipment

A Ford 1 1/2-ton pick-up truck was equipped as a service truck to supply fuel, oil, etc., to other equipment. It was fitted out with various tanks containing 140 gallons of gasoline, 100 gallons of fuel oil, 200 gallons of water, 50 gallons of grease, two 50-gallon containers of lubricating oil, and a 10-gallon can of kerosene. It also had a Curtis air compressor, driven by a Wisconsin engine, for greasing and pumping tires. A 1.5-kw 110-volt Kohler light plant mounted on a trailer furnished illumination for finishing up the work at night.

One particular section of the road known as Shady Lane had to be reworked in the spring because it was so well shaded during construction by pine, scrub oak, and palmetto trees, which line it for about half a mile, that

(Concluded on next page)



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HUBER ROLLERS

New Retread Top

(Continued from preceding page)

it never got sufficiently warmed up by the sun for the retread to set up properly and form a smooth surface. It later had to be scarified to a depth of 1 inch, reshaped by grader blades and rolled by the tandem steel roller. The best results with this type of surface can be obtained only when the temperature is above 80.

Quantities and Personnel

The major estimated quantities on this project were as follows:

Clearing and grubbing (borrow pits)	6.61 acres
Excavation, mineral aggregate	20,000 cu. yds.
Bituminous material	520,000 gals.

This 16 miles of sand-bituminous retread, 2 inches thick, was constructed by Smith Engineering & Construction Co., of Pensacola, Fla., for the contract price of \$62,296 for the State Road Department of Florida, J. H. Dowling, Chief Engineer. The work was located on Fla. 53 and 10 in Division 3 of which

H. H. McCallum is Division Engineer and G. L. Dickenson is Assistant Division Engineer with headquarters at Chipley. W. F. Jones was Inspector for the State and Charles Dillmore was Superintendent for the contractor.

New 200-Amp Welder

To provide a high-quality ac machine of medium capacity, incorporating the latest features for economy in power consumption and high-speed welding, the new 200-ampere Wilson Bumblebee transformer welder has been announced by Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.

Built-in capacitors make possible power economies up to 35 per cent, reduce power bills, and relieve overloaded transmission and feeder lines, making room for additional equipment, according to the manufacturer. The unit is also equipped with a disconnect switch. Entirely self-contained, the new 200 Bumblebee has two current ranges, the low from 30 to 110 amperes and the

high from 90 to 275 amperes. Continuous stepless current control is provided throughout each current range by simply turning the crank on the top of the machine. A full-view scale makes current settings easy to read at all times. The machine is sturdily constructed for dependable economical service, the manufacturer states.

Copies of an illustrated booklet, giving dimensions, operating data, electrical characteristics, graphs showing volts and efficiency and power-factor percentages, and other data, are available from Air Reduction on request.

More mechanics' and service tools are now available, WPB reports.

ROD BABBITTING

Another
Plant Controlled
Operation on all

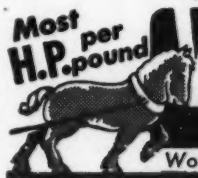
WISCONSIN Air-Cooled ENGINES



There's more to babbitting connecting rod bearings than simply applying the metal. Not only must the work be expertly done, but it is important that frequent detailed chemical analyses be made of materials in order to provide a dependable safeguard against inferior quality bearing metal, and to assure constant uniformity.



Wisconsin Engine connecting rod bearings are babbitted in our own plant, under our own complete control. A careful check is maintained to make sure that the metal is always what it should be and that it is applied the way it should be. This helps to make a better engine . . . designed to give better service on your equipment.



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It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning post-war products.

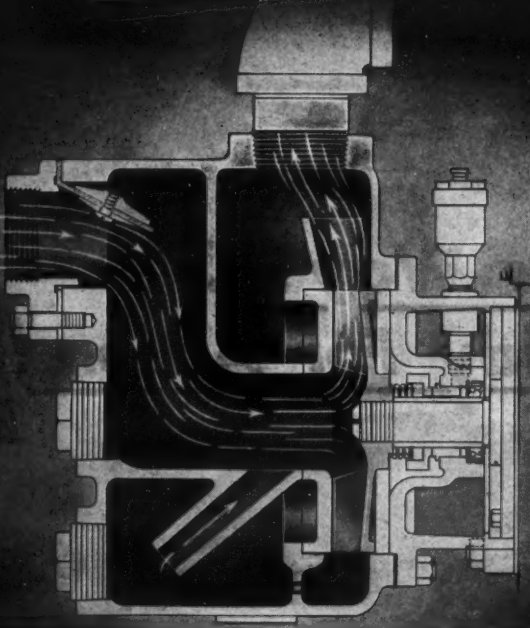


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Muscatine, Iowa



Low-Cost Road Work In a Prairie County

Mortar-Bed Gravel and Blue Shale Topped With Sand-Gravel Keep Costs Of Roads Within Budget

By FRANK D. TYSON, County Engineer,
Rooks County, Kansas

THE present low ebb of county finances prevents any but the most economical road surfacing and maintenance in Rooks County in north-central Kansas. While the present chief industry is agriculture and the raising of stock and grain, there has been considerable development in oil production in the past five years which may well increase the present \$16,000,000 assessed valuation of the county and improve its finances for road work. Of the 105 counties in the state, Rooks County is sixty-eighth in population, having only 8,000, with 1,400 at the county seat, Stockton.

A county road levy of 1.62 mills, plus the gas tax refunded by the State, brings only around \$46,000 for all road purposes. Further, the County is unable to levy the full amount allowable under the law for road and bridge purposes, which is 2.25 mills, because the total aggregate levies, which provide for all county activities, may not exceed 4.5 mills, according to state law.

Highway Economies

The topography of Rooks County is of a semi-prairie nature. There is a lot of level land, and most of the brakes are located along the south fork of the Solomon River, the only major stream. There are 225 miles of county roads within its 1,080 square miles of area. These roads are controlled by the County Commissioners and County Engineer. There are also approximately 1,200 miles of township roads which are taken care of by the various boards of township officials. Of the 225 miles of county roads, there are approximately 67 miles with light surfacing, while the balance are dirt roads which are kept in as good shape as possible, until such future time as they may be surfaced. The surfacing on the 67 miles of county roads consists of 21 miles of sand-gravel, 35 miles of so-called mortar-bed gravel, and 11½ miles of blue shale and sand-gravel.

This mortar-bed gravel consists of disintegrated limestone pebbles, from ½ to 1 inch in size, mixed with from 20 to 80 per cent of clay. These limestone particles and clay are found mixed in pits, like the sand-gravel. The mixture of limestone and clay works best when the clay content is about 40 per cent. This material is hauled in dump trucks and windrowed in the center of the road and then spread by a motor grader. After very little traffic, it sets up very hard and becomes white, making what is considered the best low-type surfacing for the money.

An experiment using blue chalk, called blue shale by some, was tried on ¼ miles of road at about 1,500 cubic yards to the mile, spreading it with a blade grader, and then rolling it with a 3-ton roller. On this about 300 cubic yards of sand-gravel was placed to act as a binder. The sand-gravel also does away with the slipperiness which develops in this chalk when it becomes wet. This road has been down and under traffic for approximately two years and seems to be standing up fairly well. It can be recommended to counties which have plenty of blue chalk and very little good graveling materials.

Maintenance

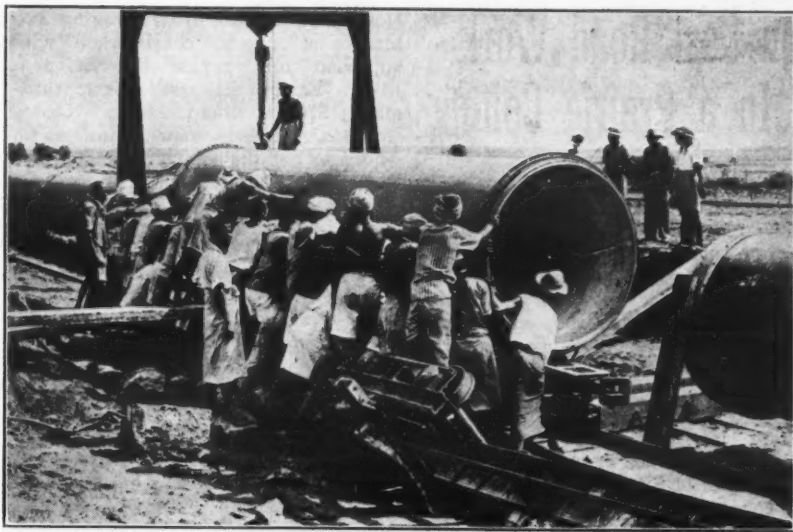
Rooks County's pre-war maintenance

organization consisted of between twenty and twenty-five men who operated 2 Caterpillar RD7 tractors, a Caterpillar 42-inch power-drive elevating grader, a LeTourneau 7-yard scraper, an Adams 12-foot blade grader, 2 Caterpillar No. 10 motor graders, a Caterpillar No. 11 motor grader, a Caterpillar No. 12 motor grader, an Allis-Chalmers Model M tractor with a Hough loader, and 5 or 6 trucks of different types and makes.

Due to the war, the maintenance forces have been cut down to approximately twelve to fourteen men and the County is gradually losing ground in its fight to keep the roads in condition.


The servicing of maintenance equipment is done mostly at the central garage

(Concluded on next page)



British Combine Photo

No time was wasted in bringing the city of Rangoon in Burma, recently liberated by the British, back to normal, to make it the springboard for new campaigns against the Japs. One of the most urgent tasks was the reconstruction of the water system. Here Rangoon civilians, working for the British and Indian Engineers, place a section of the new pipe line to Rangoon in position.



America's Most Complete Line of Material Handling Buckets

All purpose -

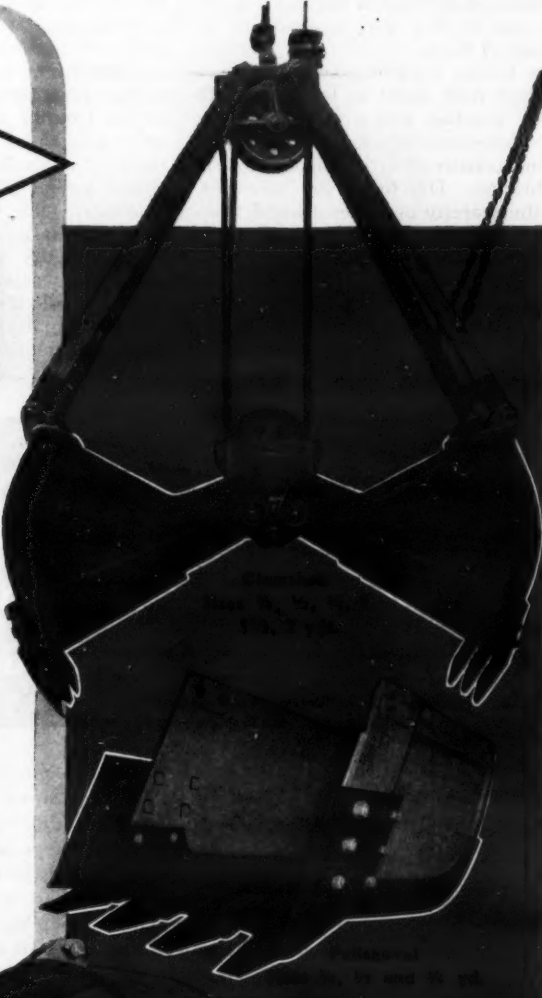
- SHOVEL
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● FRONTS, BOTTOMS, SCOOPS and TEETH shown in red on buckets are 14% manganese steel developing tensile strength up to 120,000 p.s.i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

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Low-Cost Road Work In a Prairie County

(Continued from preceding page)

age located in Stockton. There is one mechanic who stays in the shop all of the time, and the road foreman, who is a very capable mechanic, assists in the work. The shop is fairly well equipped; however, there is much shop equipment which the Department anticipates purchasing after the war.

Bridge Maintenance

State law designates as county bridges any bridges or culverts having a clear span of 5 feet or over, whether on a county or a township road. There are approximately 1,500 bridges in this category and the types are many. However, most of them are of timber construction and vary in length from 5 to 100 feet. Up until four or five years ago, there were several steel-pin trusses approximately 200 feet in length across the Solomon River, but the floods in the past year or two have washed out all but one of these.

The bridge crew consists of a foreman and from eight to ten men, with trucks, winches, and a pile driver for the maintenance of county bridges and for the construction of small culverts and bridges. Due to the war, however, and the scarcity of materials and men, the maintenance of drainage structures has been badly neglected.

Post-War Plans

The post-war program of Rooks County, at this time, is mostly talk.

However, plans are progressing for two bridges of concrete construction, with approach fills, across the Solomon River. Each of these will cost approximately \$70,000. Like most west-Kansas counties, there is some doubt as to where to get the money to match the Federal-Aid funds, as the County definitely cannot raise its share by levy. It is hoped that something will be done to permit the counties to raise extra money for post-war road and bridge construction.

Organization

The governing body of Rooks County, as in all other Kansas counties, is composed of three County Commissioners, elected for a term of four years, one from each commissioner district, of which there are three in each county. The Commissioner from District 1 is elected at one general election and the Commissioners from the other two districts are elected at the next general election. The present Commissioners are J. H. Gregory, M. W. Mock, and Armond Benoit.

The County Engineer is appointed by the Board of County Commissioners, with the approval of the State Highway Engineer, and he may hold office for as long a term as the Board sees fit. The author has been County Engineer of Rooks County for five years, having previously held a similar position in Gove County, Kans., for a period of twelve years. After receiving his appointment, the County Engineer has complete charge of all highway work in Rooks County and also serves in a supervisory capacity for the township roads. While the County Commissioners act on matters of general policy, all plans and details are left entirely to the

Engineer. In the purchase of equipment, the Engineer makes a decision and then gets the consent of the County Commissioners. The Engineer does not specify the make of equipment, that being left up to the Board of County Commissioners as long as the machine fills the specifications of the Engineer.

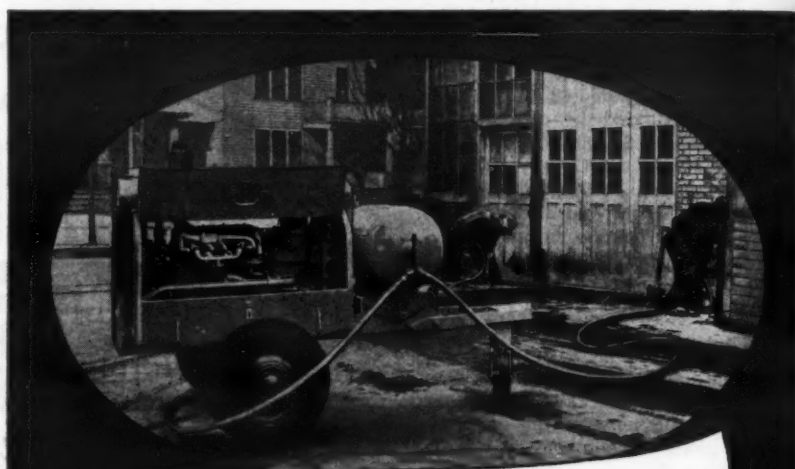
The members of the Board of County Commissioners are all active in the Kansas County Commissioners' Association and also in the Northwest Kansas Highway Officials' Association. J. H. Gregory has served as President of the latter Association. The author is a member of the Kansas Engineering Society, the Kansas County Engineers' Association, and the Northwest Kansas Highway Officials' Association, and has served as Secretary-Treasurer, Vice President, and President of these county organizations.

Regular inspection and proper lubrication will help to keep present construction and maintenance equipment on the job for the duration.

Familiar Yellow Again Brightens Tournapulls

The first Tournapull to leave the Peoria shops of R. G. LeTourneau, Inc., since 1942 with the familiar LeTourneau yellow drove out on May 26, after painters had cleaned the war paint from their spray guns. The equipment was a Super C Tournapull C3T4539 CI-H with Tournatrailer BY 2217W210-A. This unit was shipped to the account of Jaeger-Lembo Machine Corp., New York distributor for LeTourneau, for use at the New York Municipal Airport at Idlewild, Jamaica, Long Island, N.Y.

Since the war halted the use of highway yellow, painters at the Peoria plant of LeTourneau have been spraying chiefly olive drab, but also some Navy green, Marine Corps green, a bit of Coronado tan, and a little battleship gray. Olive drab is still the most popular hue for LeTourneau equipment, as the armed forces are as yet LeTourneau Customer No. 1.



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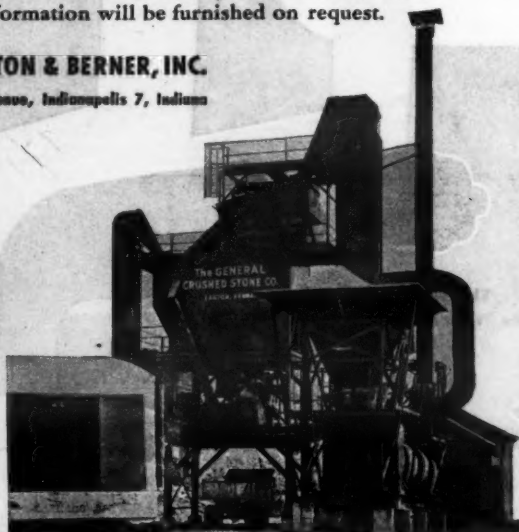
This Hetherington & Berner portable asphalt plant, recently erected for the General Crushed Stone Company in Delaware, is regularly producing from 80 to 100 tons of hot mix per hour. This is a sectional type, all-electric plant, with electrical equipment completely installed. All units are driven by individual motors and wired completely at our plant. Once the plant is assembled, you are ready to hook up to the power line and start operating. The plant is quickly assembled and disassembled, and easily portable. Refinements in design which contribute to greater compactness and increased efficiency include a larger fan and a new horizontal cyclone dust collector. Complete information will be furnished on request.

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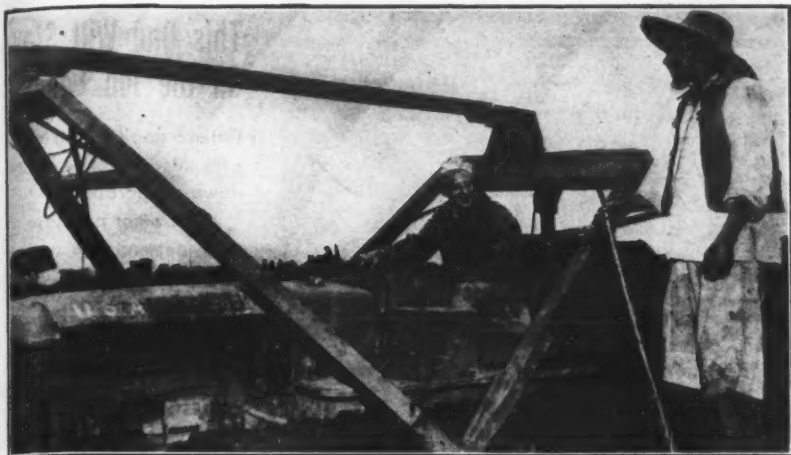


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U. S. Army Signal Corps Photo

It would take Shang Show Kwai, Chinese coolie, and his friends three weeks to do the work this Caterpillar tractor does in a day in leveling for a supply depot. This machine traveled by train, ship, plane, and truck to reach its destination in China.

Materials Situation To Be Improved Soon

Improvement in the supply situation for construction materials and components may be expected within several months, but the effects of the end of the European war are not yet apparent in current supply, the War Production Board announced recently. The steel situation seems to be improving, but lumber is still critically short, cast-iron pipe is still in extremely tight supply, and concrete and clay products are short in a number of localities but are generally in better supply than most other building materials.

The supply situation for the chief materials which are used in heavy construction is:

Steel: Structural steel, plate, reinforcing bars are somewhat easier; sheet and strip continue tight; reinforcing mesh, tight; warehouse stocks, except sheet and strip, fair to good.

Cast-Iron Pressure Pipe: No improvement in production; a slight decrease in unfilled orders, but situation is still tight.

Portland Cement: Supply adequate.

Concrete Products: Building blocks and pipe are both in good production and stock.

Asphalt: In ample supply.

Common and Face Brick (Unglazed): Nationally, unfilled orders exceed stocks, a new condition; about half the states have only a fair supply.

Structural Clay Tile: Total of unfilled orders exceeds stocks, a new condition; in general, supply is becoming inadequate.

Vitrified-Clay Paving Brick: In good supply.

Clay Sewer Pipe: Becoming less available.

Cement-Asbestos Pipe: In easy position.

Lumber: Generally, still critically short; production shows seasonal increase but is continuing below demands. Stocks continue to decrease, and exist only in small lots and in broken species, grades, and sizes.

Plywood: Little available for general construction.

Standard for Design For Structural Lumber

A comprehensive standard for engineering design with lumber is now provided by a national specification just published by the National Lumber Manufacturers Assn. Informed engineers have long recognized that lumber can be used much more efficiently as a structural material than has been done generally. The years of research on the strength properties of wood and its fastenings and behavior of lumber structures in service have made possible the recently issued first edition of "National Design Specification for Stress-Grade Lumber and Its Fastenings."

and adequate supervision of construction. Its application will mean better engineering design and construction, more efficient use of lumber, and more economical structures. It is a basic document in that, in addition to stating the conditions under which its provisions should be applied and under which the design procedures and formulae given are to be used, it lists the allowable design stresses for commercial stress-grades of lumber and allowable design loads for fastenings. These provisions and data are subdivided into chapters for easy reference to the particular problems of a project. The material is logically arranged and well cross-referenced for ease in finding specific data and provisions.

Copies of "National Design Specification for Stress-Grade Lumber and Its Fastenings" may be secured gratis by writing on your official stationery to the National Lumber Manufacturers Assn., 1319 18th St., N. W., Washington 6, D. C., and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

The Specification is based on and recognizes the value of competent engineering design, accurate fabrication,

Roadway and Runway Maintenance Units

Three maintenance machines for repairing airport runways, highways, roads, and parking areas are featured in Bulletin W642 recently released by Littleford Brothers, Inc., 485 E. Pearl St., Cincinnati 2, Ohio. The first of these units is the trailer-mounted No. 84-HD tar and asphalt kettle with a hand-spray or motor-spray attachment. The second is the Model 155 Trail-O-Roller, a portable motorized roller which is capable of being towed behind a truck, gives the compaction of a 5-ton tandem and can be changed from rolling to trailing and vice versa in 2 minutes. The third item is the No. 101 Utility Spray Tank which has a spray bar, hand spray, and pouring-pot outlet to handle a wide variety of construction and repair jobs.

Copies of Bulletin W642 will be sent promptly to readers of CONTRACTORS AND ENGINEERS MONTHLY writing direct to the manufacturer.



Designed for Tough Rock Digging. Heavy welded box boom. Boom-foot shock absorber takes out lateral twisting strains. Larger shipper-shaft sprocket gets more push into crowd action. Chain drive tightened by power. Three-foot boom point sheaves go easy on hoist cables. Straight, simple shipper shaft comes out easily. No boom weakness below shipper shaft because shipper shaft is set into upper edge of boom, not through center.

These base machine advantages, too, add up to better rock performance: Separate crawler frames provide the flexibility needed for tough digging. Adjustable hook rollers make possible the fine adjustment that eliminates tipping. Power clutch, set by 15-pound pull, retains "feel" of load. Straight splined shafting, not weakened by shoulders and keyways, adds digging strength.

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HEAVY-DUTY CONSTRUCTION EQUIPMENT

Large Road Program Is Planned by Swiss

Reduction of Traffic Accidents on Inadequate Roads, Increase in the Tourist Business, and Employment Objectives of Post-War Plan

★ **ALTHOUGH** one of the very few countries in Europe not confronted with a major reconstruction problem, Switzerland is nevertheless planning an extensive public-works program in order to provide employment in the post-war period. Of the contemplated expenditure of 2,953,900,000 Swiss francs (a Swiss franc equals 4.3 cents), more than one-third will be spent on the highways of the country, according to a report in a recent issue of *Foreign Commerce Weekly*.

During the war, highway construction was necessarily restricted, but Swiss authorities continued highway planning, guided by the belief that there will be a great development in motor traffic after the war. The Federal Highway Inspectorate, with the assistance of a commission of highway engineers, has studied the problem carefully and a general road-building program was approved by the Federal Council in June, 1943. By the end of that year, the construction value of plans fully ready for execution amounted to approximately 100,000,000 Swiss francs.

Switzerland does not, it is stated, intend to build up a completely new system of highways according to foreign prototypes. Most of the development plan, which is to be realized only in several stages, consists in adapting existing roads to the requirements of modern traffic. The following widths are planned, based on density of traffic: 37.9 miles, or 3.6 per cent of the total road construction, will be 39.4 feet in width; 488.4 miles, or 45.8 per cent, will be 29.5 feet wide; and 538.8 miles, 50.6 per cent, will be 23 feet in width.

The general objectives of this extensive highway program, in addition to the creation of employment, are a reduction in the number of road accidents attributed to inadequate roads and crossings, and the promotion of the tourist and hotel business.

Highway Administration

The principal or main highways in Switzerland are built, maintained, and owned by the twenty-five cantonal governments. Local roads as well as the streets in the villages, towns, and cities are under the jurisdiction of local authorities. The Federal government is not engaged directly in highway construction, but it controls and influences the cantonal activities through subsidies for road building.

In carrying out the post-war program, the Federal government will make the granting of contributions contingent upon the cantons following the approved uniform requirements in their road-building programs. The Federal government felt it necessary to establish a common post-war highway plan, but the details as well as the construction will remain in the hands of the cantons.

Wartime Difficulties

Since the beginning of the war in Europe, several types of highway materials disappeared from the market and the prices for all road-building materials, especially imported ones, increased substantially. Most of the importation of surfacing materials ceased in 1940.

The wartime shortage of bituminous materials and the greatly reduced choice of qualities have become very serious handicaps in road construction and maintenance. From 1939 to 1943, inclusive, only 178.3 miles, or less than

2 per cent of the total length of cantonal roads, were surfaced, as compared with 1,087.5 miles, or more than 10 per cent of the total mileage, from 1934 to 1938. On January 1, 1944, the combined length of Swiss cantonal roads was 10,179.8 miles, of which 4,843.2 miles were dust-free.

The shortage of tar and bitumen for surfacing forced the cantons not only to reduce their programs of road surfacing, but also to limit to a minimum the repair of damaged surfaces. The contingents of materials for road building reached a minimum in 1942, when the cantons received only about one-tenth of the pre-war consumption. In that year, the cantonal road-building departments were unable to make even the most urgently needed repairs, and in some cases road work requiring tar and bitumen was completely suspended. Consequently, the standard of maintenance on Swiss highways became so low that for 1943 the Federal authorities had to increase by 55 per cent the allot-

(Concluded on next page)



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Lightweight
**DRAGLINE
BUCKETS**

DESOTO FOUNDRY, INC. • MANSFIELD, LOUISIANA

Large Road Program Is Planned by Swiss

(Continued from preceding page)

ment of bitumen and tar for roads. This increase was exceedingly modest, compared to pre-war consumption, but did make possible vital repairs if the materials were carefully used.

Sources of Funds

Funds for the construction and maintenance of roads in Switzerland, in peacetime, are derived chiefly from two sources: motor-vehicle taxation; and the cantonal portion of the import duty on gasoline. A part of the funds collected through ordinary taxation is also used for road purposes. Since the outbreak of the war, taxes on motor vehicles and gasoline have dwindled to such an extent that they have lost their former dominant position for financing highway construction and maintenance.

Besides the duty on gasoline, the Confederation has paid other highway-construction subsidies to the cantons, totaling more than 900,000,000 francs, mostly for the improvement of existing, or the construction of new, mountain highways. "These special subsidies go back to a decision of the Federal Council, dated April 4, 1935, that 7,000,000 francs from the revenue from duty on gasoline must be reserved every year for financing mountain highways. Since 1940, the reduced revenue from that source has not been sufficient, but the Confederation has nevertheless continued to pay these subsidies.

The Future Program

Post-war highway construction will be financed from public funds, and the Federal, cantonal, and communal authorities will share the costs. It is reported that the cantons will bear the bulk of the cost, since their financial situation is comparatively most favorable and has improved during the past few years.

The total budget of 993,700,000 Swiss francs recently decided upon for road construction is divided according to various types of roads, as follows: local roads, 606,000,000 francs; main highways, 315,400,000 francs; and mountain roads, 72,300,000 francs. The plans provide for the establishment of a system of highways of which one will run from north to south, three east to west, and a number of others from the mountain-pass roads to the various main centers of traffic.

Prior to the war, Switzerland ranked fourth among the nations of the world in the number of automobiles per capita. Authorities believe that in the post-war period the number of motor vehicles in the Confederation will reach 200,000, 1 for every 20 inhabitants, compared with 124,195 vehicles, or 1 for every 34 persons, in 1938.

With roads in their present condition, increased traffic would increase the number of accidents in the mountainous terrain. According to some estimates, the number of accidents may double and perhaps increase to 80,000 annually. If it is possible to prevent only a fraction of these accidents by adequate improvement of the Swiss highways, it is claimed that the result will be not only a saving in lives, but also an economic gain.

California Highways

Over Ten-Year Period

California has led all other states in the number of motor vehicles registered during the past few years. Imposts on motor vehicles and other highway revenues in that state during the decade 1934-43 aggregated \$878,586,000, of which \$97,370,000 represented Federal-Aid and \$20,605,000 was appropriated

from the state's general fund, according to a study made by the National Highway Users Conference.

State highway construction costs during the same period were \$271,962,000; maintenance, \$96,461,000; administration, equipment, and engineering, \$21,845,000; collecting motor-vehicle impost cost \$38,538,000; highway policing, \$28,828,000; debt-service interest, \$28,966,000; principal, \$32,184,000; local streets and roads, \$224,486,000; and non-highway purposes, \$105,794,000, which was partly offset, however, by the \$20,605,000 appropriated to highways from general funds. These costs left an unexpended balance at the close of the period of \$29,492,000.

Of the state's 97,705 miles of rural highways, 29.16 per cent have been improved into low or high-type bituminous and portland-cement concrete roads, which exceeds, relatively, the 15.57 per cent of national mileage likewise improved. However, as to the highways surfaced with gravel or stone, the national figure is 28.74 per cent,

compared with 11.25 per cent in California. The State's use of soil as a surfacing material is indicated by the 13.82 per cent of its mileage so treated, compared with 3.44 per cent throughout

the nation.

These figures are taken from the "Highway Facts" studies being issued by the National Highway Users Conference for each state.

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<p>"entirely eliminated expense involved in aligning side forms as by other methods." *Claude Fisher</p>	<p>"after paving 2,500,000 square yards, had unbelievably low maintenance costs." *J. A. Casson</p>	<p>"on a 12 1/2' runway our two 34E pavers were never delayed one minute for finished subgrade." *Arizona Constructors</p>	<p>"on the Arroyo Seco job, 12" to 14" rock which prevailed was handled without hand picking." *Radich & Brown</p>

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An Extensive Depot For Equipment Repair

**Huge U-Shaped Building
Covering 5½ Acres Is Well
Tooled; Normal and Wartime
Operations; Under-Manned**

By THEODORE REED KENDALL,
Editor

† FEW states can boast a central repair shop for state highway equipment with 5½ acres under one roof, but that is exactly what Virginia has in the U-shaped building it acquired following World War I. Built as an Aviation Repair Depot, its size, central location, track facilities, shops and storage areas all under one roof made it ideally adaptable for an equipment repair depot, and the Virginia Department of Highways was very fortunate in being able to secure it.

The two legs of the U are 970 feet in length and 80 feet wide, with fire walls every 204 feet, and the east end of the building is 192 feet wide. A central track and roadway 32 feet wide serves for the delivery of supplies by rail or truck, with wide loading platforms at either side. For once we have seen a building large enough for the shop requirements of the state owning it. In fact the entire building has never been completely occupied by the Virginia Department of Highways, so that the State Guard, WPA, Conservation Commission, Forestry Service, and others have had storage space made available on the ground floor or basement.

Instead of the beehive of activity one would hope to find today in such quarters with its wealth of tools, there is a paucity of work going on. The armed forces took their toll by enlistment and the draft, and the entire eastern section of the state is seething with war activities which drew away a large share of the machinists and mechanics. A pre-war staff of 150, about one-half of them shop men, has dwindled to about one-tenth so that the earlier routine of equipment care has been reversed.

Routine Equipment Care

The state is divided into eight districts, each under the administration of a District Engineer who is responsible for all construction and maintenance in his district. A shop located in each district formerly handled minor repairs only, but since the war depleted the Central Equipment Depot of mechanics the district shops have taken over the major repair load, because they can use equipment operators as helpers in the shops.

Each district has four, five, or six Resident Engineers, each responsible for operations in a group of counties, as Virginia, on July 1, 1932, assumed responsibility for the roads in all but three counties. These roads now constitute the secondary system of the state. Each Resident Engineer has a small headquarters building for his office, and there are a one-stall repair shop, supply room, and office for a

Residency Mechanic. This man has a truck which is a portable repair shop in itself, and as he circulates over the residency he attends to such minor repairs or adjustments as are required. If the work is beyond his equipment, he reports it to the District Equipment Superintendent who goes over it in the field and decides whether the repair can be done in the district shop or should be sent to the Central Equipment Depot in Richmond for major overhaul.

Well Tooled Depot

The main entrance and shipping section of the Richmond Central Equipment Depot are located at about the middle of the north side which is ap-

(Continued on next page)



U. S. Army Signal Corps Photo

The Army Engineers enlarged this airstrip on Okinawa to provide a base for air attacks on the Japanese home islands.

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... to pull a gear
... straighten a shaft
... press a bushing
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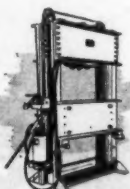
The Rodgers is such a versatile unit for so many varied applications in a shop that usually it is considered indispensable. Here is why it's versatile—look at the Rodgers Model 108 above, for example. It is simple and sturdy, yet so flexible that the opening between the top frame and bolster may be set from 4½" up to 32½" by adjusting the alloy steel pins upon which the bolster rests. A hand crank easily raises or lowers the bolster for adjustment. The 100-ton cylinder may be mounted as shown, inside the press frame head, or hung below—and is adjustable across the entire width of the frame. Ram travel of the cylinder may be either 6½" or 13". When desirable, the press can be used resting on its side for more convenient handling of large pieces. Power is supplied by the powerful Rodgers 4-Speed Hand Pump, mounted on press or separate, or by a Rodgers Power Pump Unit. Once you get a Rodgers, you'll say too . . . "it's the handiest tool in the shop".

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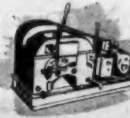
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for every
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Awarded the Gold Medal for Safety
Ask for Catalog 44

Templeton, Kenly & Co., Chicago 44, Ill.

An Extensive Depot For Equipment Repair

(Continued from preceding page)

approached by a wide bituminous road. The road extends around the east end and along the south side where it slopes downward, giving access to the basement where a storage garage and other facilities are located.

Extending from the shipping department eastward to the end of the building are the magneto and electric shop and the major machine shop. In the electric shop are a testing stand for magnetos, a metal-top bench for the overhaul of magnetos and generators, a Hobart motor-generator set, and a bench for charging eighteen storage batteries at a time. In this shop they formerly rebuilt their own batteries. Located also in the room are the main switchboard for the shop and a direct-current generator which drives all dc motors for the machine-tool equipment. An alternating-current motor nearby drives the line shaft for the machine shop.

The well equipped machine shop has not only considerable heavy-duty equipment purchased from its original owner, but also has many special machines installed by the Department itself. These include a boring mill, a Cincinnati Shaper Co. shaper, a planer with a 12-foot bed, a 24-inch x 6-foot heavy-duty American Tool Works Co. lathe, an 18-inch x 6-foot Advance lathe, a Lehmann 21-inch x 5-foot and a LeBlond heavy-duty 18-inch x 7-foot lathe, a Champion drill press for a 1-inch drill, numerous bench drills and grinders, a Barnes of Rockford radial drill for a No. 5 shank, and three Heald cylinder grinders.

In this shop they make their own conical asphalt pouring pots for pavement joints and cracks. An interesting piece of equipment of an unusual nature is an electric water heater for providing hot water to expand cylinder blocks when testing for cracks.

Additional heavy-duty equipment includes a Van Norman boring bar, two Landis crankshaft grinders, a Landis shaft grinder, and a Landis piston grinder, a 24-inch-stroke Rockford shaper, an adjustable radial drill which is a relic of the War between the States, but is still serviceable and effective, a Cleveland plain miller, a Cincinnati milling machine planer, a 12-inch x 4-foot Cleveland lathe, and a Davis lathe, with the tail removed, used for testing hydraulic-hoist pumps after repair. The shop has several power hack saws and grinders, a Warner & Swasey threading machine, and in an enclosed section a G-E electric welder. Included also in the shop equipment are a 50-ton Manley hydraulic press, a 450-ton tire press, which is also used for track pins, bushings, and sleeves, and an Ingersoll-Rand air tool for squaring the ends of drill steel.

The engine assembly shop is located in the central portion of the east end of the building and is particularly well equipped, with a Cleveland bench lathe for boring rod bearings, a thermostatically controlled electric babbitting machine, a reamer for piston-pin bushings, two hand-operated line reamers for main bearings, a Sioux valve-seat grinder, dozens of electric hand drills, a Hall Mfg. Co. valve-seat grinder, and other small equipment. A solid steel table is used for assembling the engines, and there are three run-in stands, the center one of which is equipped with a radiator hinged at the front so that it can be laid forward when the engine is either being set or removed. The other two stands use the same radiator when they are in operation. A double-A caster-wheel frame is used for moving motors about the shop.

Just south of the engine assembly shop is the area for servicing automobiles. The equipment there includes a 3-ton Joyce lift, a complete Lincoln greasing outfit, and a Timken front-wheel-bearing service unit. An L-shaped area adjacent to the engine assembly shop and the machine shop is used for the overhaul of automobiles. In this section is located a pair of Ingersoll-Rand horizontal compressors operating at 90-pound pressure and delivering air to an accumulator in the basement. The compressors are alternated to keep them in prime condition.

In the southeast end of the building are the tractor shop and the woodworking shop followed by the metal shop and upholstery shop. The woodworking shop is equipped with an American borer, a large well guarded band saw, a J. A. Fay & Egan Co. saw table, a power cut-off saw, a 1½-inch planer, a DeWalt radial saw, a small drill press, and an additional band saw. In the metal shop are a Greenard arbor press,

(Concluded on next page)

Hard-Facing Saves \$19.00 Roller Replacements



Generally a one-pass layer of Coast Metals is all that's needed to restore original dimensions. Where rollers are badly worn, first build up the surface almost to finished size with mild steel.

THE NEXT TIME your double-flange tractor rollers become badly worn, try reclaiming them with Coast Metals Hard-Facing. Not only will the cost of new rollers be saved, but delays in getting replacement parts are avoided. Idle labor is reduced to a minimum. One company reports a replacement saving of \$19.00 for each roller re-

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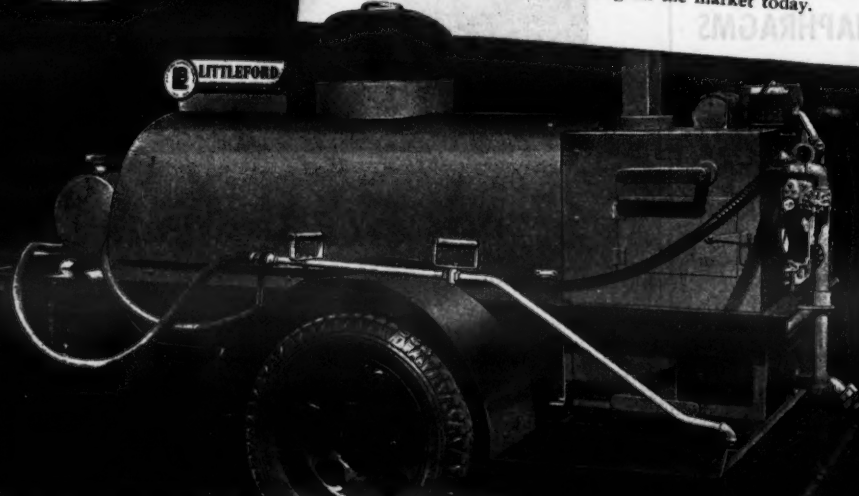
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DO YOU KNOW HOW MANY JOBS THIS MODEL NUMBER 101 Utility Spray Tank Will Do?



With the Spray Bar, Hand Spray Attachment and the Pouring Pot Outlet the No. 101 will do Small Application Jobs, Shoulder Widening, Patch Work, Crack Filling Work and any other road maintenance jobs that present themselves. No. 101 can be used to unload Bituminous materials from storage tank to fill drums. When planning those Road, Street, Highway or Airport Runway Construction or Maintenance jobs be sure to have a No. 101 on hand.

For an all around Utility unit the Littleford Model No. 101 Utility Spray Tank excels anything on the market today.



An Extensive Depot For Equipment Repair

(Continued from preceding page)

rolls for curving sheet metal, a Walker-Turner drill press, Pexto electric shears, a Pexto power straight-line beader for metal road signs, and a shop-built hydraulic press for pressing in the curved beads at the corners of signs. There are also a large breaker and a small breaker for flanging material, and hand shears with a long lever.

The blacksmith shop is located in the center of the U, opening out on the railroad track and shipping platform. In this shop are an Ingersoll-Rand drill sharpener, an oil heater for drill steel, a cold bender for steel, a large air-operated trip hammer, the usual forge, anvil, and oil furnaces, as well as three acetylene welding and cutting outfits of various makes. There are a Westinghouse Flexarc welder, and a Wilson gas-engine-driven electric welder of the portable type. A heavy-duty power-driven set of cut-off shears is installed for cold cutting.

Extending down the south leg of the building towards the west are the truck and heavy-equipment overhaul section, the radiator shop, and plumbing shop where repairs are made to air drills.

Basement Equipment

The paint shop opening at ground level is located in the basement of the south wing. Here the silk-screen method is used for stenciling signs and a unique method of speeding up the carrying of signs past the spray-gun man has been developed. A truck 75 feet long with three pairs of wheels runs on a track so that the signs can be laid on this truck, the spray man stands in one position in front of the suction fan which draws off the excess spray, and the signs are quickly moved in front of him, saving a great amount of time and man-power.

A new installation in the sign shop is a Gehnrich electric oven for baking enameled signs. This oven is 11 feet deep, 8 feet high, and 10 feet wide, is automatically controlled with a maximum temperature of 600 degrees F, with an average of 200 degrees, and will handle 200 2 x 2-foot signs or 450 smaller signs at one time. The sign

shop is also equipped with a DeWalt radial saw for quickly doing all of the cutting for wooden signs. A small separate building is supplied for cleaning signs before priming and painting.

West of the sign shop in the basement are the truck washing and painting shop and a large area for truck storage.

Oil Reclaiming

One of the newest pieces of equipment to be installed in the Depot is a Hilco oil-reclaiming unit. A 10,000-gallon elevated steel tank is being erected outside the Depot for storing used crankcase oil collected from all over the state. This oil, now received in 55-gallon drums, is run into the heater tank of the Hilco unit where it is thoroughly mixed with a suitable grade of filtering material. The oil is heated to about 400 degrees F in one hour, during which time the mixture of oil and filtering material is agitated. This permits the tars, carbon, abrasives, dust, and acid to be absorbed by the filtering

material, and the light ends, including water and fuel dilution, are vaporized and condensed in a distillate tank. When the batch has reached the proper temperature, the discharge valve is opened and the mixture runs into a tank below from which it is forced under pressure through a series of filter papers. The clean finished oil is discharged at the rate of about three barrels in an 8-hour day. This oil is of a 30 SAE grade as it is a mixture of both higher and lower-viscosity oils.

Outside on the approach ramp is a Kerrick Kleaner for cleaning parts, oil drums, and equipment prior to repair, re-use, and overhaul, respectively.

Parts and Shipping Departments

In the central portion of the Depot in the north wing are three stockrooms: one for automotive parts, a second room containing automobile accessories and nuts and bolts, and the third, a general warehouse for heavy hardware.

Requisitions from the various dis-

tricts are divided in the office according to the warehouse from which the supplies will be taken. The various requisitioned parts and materials are then gathered and brought to the central shipping room where they are placed in boxes marked for the different districts and are either carefully packaged for shipment by express or are picked up by district trucks sent for the purpose or which have just been repaired and are being returned to the districts.

Personnel

The Central Equipment Depot of the Virginia Department of Highways in Richmond is operated, under the direction of General J. A. Anderson, Commissioner, and C. S. Mullen, Chief Engineer, by C. B. Leech, Jr., Equipment Engineer, with H. L. Lewis as Shop Superintendent.

Natural rubber stocks are below the "danger point", and military needs are tremendous. So conserve your rubber!

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From Steam on Wheels with BROS HEATERS

Here is real steam generation—full pressure hot dry steam within twenty minutes from a cold start—in ample quantities for the job. Will handle from two to five 10,000 gallon cars daily and can be used for heating storage tanks, thawing frozen culverts, heating concrete aggregates, operating pile drivers and any other use requiring high pressure steam.

Compactly built, light in weight, Bros Heaters

are readily portable and can be quickly wheeled into operating position. Quick adjustment to the amount of steam needed to balance any load is made possible by flame control air-atomizing burner. When heating tank cars with recovery of the condensate, maximum efficiency is obtained per pound of fuel oil consumed. Which proves, "You get the most from a Bros." Wm. Bros Boiler & Mfg. Co., Minneapolis 14, Minn.

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**CONTINENTAL
RUBBER WORKS**

ERIE, PENNSYLVANIA, U.S.A.



U. S. Army Signal Corps Photo

This floating plant of the Army Engineers can produce 25,000 kw for emergency service.

Engineers Develop Floating Power Plant

Floating power plants, capable of supplying a small city with electricity, are one of the war-born developments of the Corps of Engineers, U. S. Army. The idea was devised after a battleship had hooked up to the power lines of a large northern city and supplied "juice" in an emergency. Increased demands for power, due to the war, have resulted in overtaxing the existing utility systems in various areas throughout the country, and necessitated the construction of a mobile unit capable of being readily moved from one location to another to relieve temporary critical power situations in specific areas.

The latest and largest of these floating mobile plants is the Inductance, operated by the Memphis, Tenn., Engineer District, of which Colonel Garner W. Miller is District Engineer. Rated at 30,000 kw, the plant is housed in a steel hull 318 feet long and 53 feet wide, with a maximum draft of 14 feet. Power is generated at 13,800 volts by a 30,000-kw alternator driven by a 19-stage steam turbine. Steam is supplied to the turbine at 850 pounds per square inch and a temperature of 900 degrees F by two marine express-type boilers equipped to burn either oil or gas separately or simultaneously. Two 300-kw diesel-driven generators are provided for emergency use aboard the plant and for starting up. A three-phase power transformer rated at 37,500 kva is provided to raise the generated voltage to the value suitable for transmission. Taps are provided so that voltages ranging from 63,100 to 138,000 may be obtained as required. Although rated at 30,000 kw, the plant can deliver 36,000 kw for an extended period. A total of 43 persons are required to keep this power plant in operation 24 hours a day.

In addition to the power-generating equipment, there are included as part of the plant a shop with the necessary machine tools and equipment for making general repairs, a galley and living quarters for feeding and housing the operating personnel, and an office for handling administrative work. The

unit is therefore capable of operation, if necessary, in isolated localities for extended periods of time.

During the seventeen months in which the plant has been in operation, approximately 264,724,000 kw-hours of

electrical energy have been generated. Most recently the Inductance has been stationed at Jacksonville, Fla., furnishing power to make possible shut-down for repairs of some of the units in the municipal power plant. Due to the tremendous load demands on the city plant, it has not been possible to shut down for needed repairs, without sacrificing service to the city. The Inductance has solved that problem.

Present plans call for continuous operation of this floating power plant for the duration of the war.

Overlay Electrodes For All Ferrous Metals

Rexaloy overlay electrodes for use with ac or dc welding machines, which were recently announced by The Sight Feed Generator Co., Richmond, Ind., are metallic-coated rods for use in surfacing parts of machinery made of all ferrous metals or alloys. These electrodes are designed to replace or build

up worn-away metal. The purpose of Rexaloy overlay electrodes is to prolong the life and increase the efficiency of machinery parts subjected to particularly hard wear.

These electrodes are made in $\frac{1}{8}$, $\frac{5}{32}$, $\frac{3}{16}$, and $\frac{1}{4}$ -inch sizes, can be used in all positions with either ac or dc, and their deposits have a Brinell hardness rating of 300 to 687, depending on the base metal. Designed on the principle that toughness is a more desirable property than hardness for their specific purpose, Rexaloy electrodes do not become brittle after application, but retain, within a few points, their original toughness.

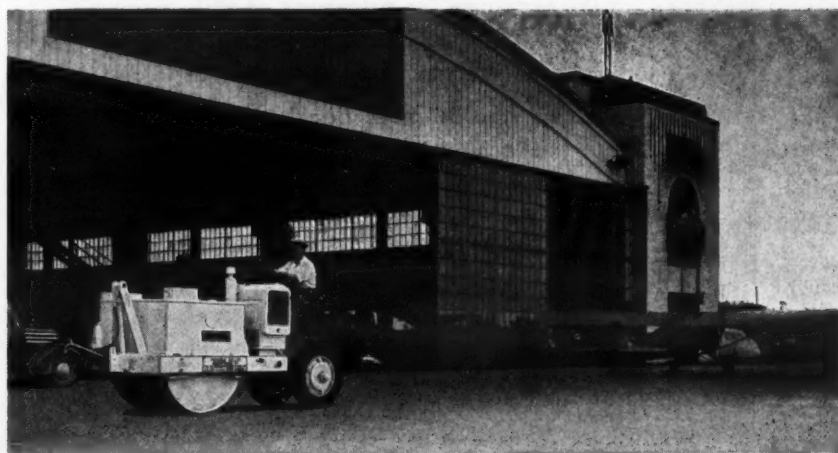
A new 4-page folder, describing the various types of Rexaloy electrodes and their uses, with helpful suggestions on how to apply them as well as which type to select for a specific job, may be secured by interested contractors and state and county highway-department equipment men direct from the manufacturer. Just mention CONTRACTORS AND ENGINEERS MONTHLY.

FOR AIRPORT CONSTRUCTION AND MAINTENANCE



Galion road machinery—rollers and graders—played an important role in this war, helping to build and maintain strategic roads and airports on many of the fighting fronts all over the world.

The same dependability and resourcefulness will be available for those roads and airports contemplated for the future in this country and abroad. Big motor graders for the primary construction and earth moving jobs . . . rollers for precise compaction in apron, runway and taxiway construction and maintenance.



Galion portable roller being used for general maintenance work around the airport. For patching work this unit is ideal—every airport should have one.



Galion tandem roller (left)—available in three sizes with weight variable from 5 to 14 tons. Diesel or gasoline power. Also three-wheel and trench rollers.

Galion motor graders are big and strong, able to stand up in day-after-day service. Have a wide range of blade adjustment, tandem drive, hydraulic control and other features. Write for our latest catalog.

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Coordinated Planning For Post-War Roads

Inclusion of Principles Of Landscape Design With Essential Engineering Fundamentals Is Needed

✦ FOR a number of years now, highway departments have given consideration to the incorporation of many of the principles of landscape design with essential engineering principles in the control of highway development programs. Much has been accomplished through this effort to bring these two important factors into close harmony.

A great many details in the improvement of the roadside have become somewhat standardized and are automatically included in construction plans and specifications. These details relate principally to such factors as flattening of slopes, inclusion of topsoil on the backslopes, fill slopes, etc., and the installation of suitable ground cover within the right-of-way area. Secondary importance has been given to the planting program along highways, as other factors seemed more fundamental and therefore more urgent.

Much has also been accomplished during the past few years in the establishment, for public use, of strategic areas of interest along the main highways. These include such featural developments as outlooks, concourses, roadside picnic areas, state historical markers, state line markers, etc. Much of this work has been accomplished through the aid and cooperation of Civilian Conservation camps, Works Progress Administration, National Youth Administration, and other Federal agencies.

It is not the purpose of this discussion to elaborate upon the accomplishments of the past, because results have fully demonstrated the value of cooperative planning. The elements of sloping, topsoiling, establishment of ground cover, and the creation of rest points have proved their worth not merely in the aesthetic aspects but as contributing to economy in maintenance, to an added factor of safety, and to the convenience of the public.

Charting a New Course

The ultimate objective in highway design is the total inclusion of all aspects that fulfill the needs and requirements of the traveling public. Up to the present, the chief emphasis of landscape design has been directed in most states towards the solution of the detailed problems referred to above. The roadside as particularly influenced by the cross section has seemed to be the chief accomplishment, other than the featural developments. No belittlement of the importance of the cross section is intended, as it plays a most important role with reference to safety, economy of maintenance, and appearance.

There is, however, a much broader application of the principles of landscape design in coordination with the principles of engineering design that needs greater emphasis and closer cooperation. This is the control of highway design through the progressive steps of reconnaissance, surveys, and initial design, all considering the location, alignment, and profile.

It is the same principle as expressed by the late R. E. Toms, then Chief, Division of Design, Public Roads Administration, when he said that "cooperation of the landscape architect with the highway engineer before the center line of a new highway appears on any plan sheet is always desirable".

Thomas H. MacDonald, Commissioner, Public Roads Administration, fur-

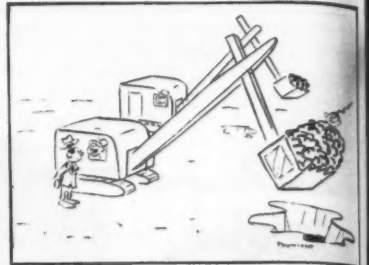
ther emphasized the fundamental policy of this dual study by stating, "There will be wider recognition of the economic necessity of correlating landscape design principles with highway engineering design in the initial reconnaissance and construction work".

Highway engineers fully concur in the necessity and the advisability of a close cooperation that will bring all elements together to contribute to comprehensive design. Emphasis has been laid on the relation of soil requirements, landscape considerations, drainage surveys, and right-of-way recommendation to the total design, and the need for cooperative investigations. Some highway departments have also urged that the survey recommendations studied by those dealing with these considerations

should be supplemented by occasional check as to plan developments prior to final approval.

In this broader application of the principles of landscape design in coordination with the principles of engineering design many highway departments have not measured up to their opportunities. For one reason or another this program of cooperation has not fully functioned and there has been a drifting into segregated solutions rather than a definite move towards unity of purpose and effort.

Many causes have prevented a jointly coordinated design from the initial stages of reconnaissance through to the completed plans. Nevertheless, the fundamental principle remains that cooperation, to be effective, must not be a sectional solution by one or another but rather depends upon a joint approach to the design and a mutual consideration by all members of the highway team through all stages of reconnaissance, location, alignment profile, cross section, and construction.



"NOW whose shovel digs the deepest?"

Now that all states are working intently on their post-war planning programs, the time is opportune for a renewed effort to strive for the ideal which unites all elements into a comprehensive design, taking every advantage of all aspects of both engineering and landscape design.

This article is inspired by a report of A. R. Nichols, Consultant Landscape Architect to O. L. Kipp, Chief Engineer of the Minnesota Department of Highways.

PROGRESS starts with Excavation

Excavating to help build a way of life . . . excavating to help destroy an enemy . . . the purpose and the operating environment are different — but the basic operations are the same. A road, for example, whether it carries the products of peacetime or the ordnance for offensives, is still a road. The same amount of dirt must be moved to build it!

This new free 36-page booklet gives you the dramatic picture story of excavating in war and peace. It shows you, too, why the more than

3000 fighting Bucyrus-Erie excavators, as their peacetime counterparts have done yesterday and will do tomorrow, perform with an efficiency that makes them truly fundamental tools for progress.

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The new Flight-Veyor is equipped with 1 3/4-inch chain flights and will carry a variety of bulk material.

Portable Conveyor For Steep Inclines

For raising bulk materials up steep inclines impracticable for a belt, the American Conveyor Co., 2435 Indiana Ave., Chicago 16, Ill., has announced the Flight-Veyor, the latest addition to its line of portable electric conveyors. Equipped with 1 3/4-inch chain-flights instead of a belt, it will handle sand, binders, clay, and similar bulk material. The Flight-Veyor is built in four sizes, including two widths of 8 and 12 inches, and two lengths, 13 and 20 feet.

Handling bulk material up steep inclines through the use of chain-flights instead of a belt is the feature which distinguishes the Flight-Veyor from other American conveyor models. It lifts up to 14 feet and is capable of delivering a steady flow of material at the rate of 160 feet per minute, the manufacturer states. All models are equipped with a 40-foot heavy-duty rubber cable. Drive is by means of roller sprocket chains through a countershaft. The sprocket shafts are mounted on self-aligning ball bearings permanently sealed to retain lubricant and keep out dirt. At the head pulley are two steel-frame 6-inch take-ups, and a heavy-duty pole switch is housed in a protecting box. The frame of the Flight-Veyor is of rigid heavy-gage-steel construction, welded throughout to prevent bending or twisting. The flight pan is of heavy high-carbon steel.

Further information on the Flight-Veyor and its uses in handling bulk materials may be secured direct from the manufacturer. Just mention this illustrated item.

Post-War Highways For Rural Schools

The benefits which rural education will derive from the post-war highway construction program were outlined by Charles M. Upham, Engineer-Director of the American Road Builders' Association, at a conference of educators recently held in Washington. Thousands of school districts can be consolidated by improving our secondary or country roads under the Federal-Aid Highway Act of 1944, he explained, thus increasing the educational opportunities for farm children.

"The little red schoolhouse is all right in tradition, but it had its drawbacks. Having to trudge daily through mud, dust, or snow to reach it impaired its value," Mr. Upham said. "All trends are now towards the modern consolidated school, with pupils delivered in school motor buses, but these school-houses depend upon the highways. Surveys show that there are between 5,000 and 10,000 rural-school consolidations that should be made, but are now impossible because of road conditions."

Citing a study made by his associates

in a number of representative counties, Mr. Upham pointed out that nearly 70 per cent of the schools are still on dirt roads. "Highways are the bottleneck to the growth and expansion of the consolidated school," he said, "but under the post-war program of over \$1,000,000,000 a year for construction purposes, more than \$300,000,000 will go for farm-to-market roads. This is a good start on pulling our country schools out of the mud."

"America has 2,400,000 miles of rural roads serving 6,000,000 farms, but only 45,000 miles have a high-type pavement and 99,000 miles have a low-type bituminous surfacing," Mr. Upham stated. "The rest of these country highways, 2,256,000 miles, have a non-treated surface, are merely graded and drained, or are simply trails. When we consider the millions of farm children who must use such roads, the need for giving attention to our highways strictly from an educational angle becomes apparent."

In conclusion Mr. Upham mentioned

other important advantages of improved country roads in the rapid and regular delivery of farm products to market, the reduction of costs in car

and truck operation over improved highways, the delivery of mail, and greater accessibility of the larger centers for shopping and pleasure trips.

WINPOWER

ELECTRIC PLANTS

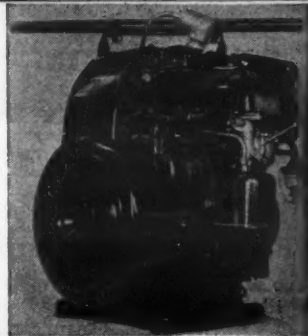
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Immediate shipment from emergency stock on many models A.C. and D.C. 350 to 25,000-watt plants. Wire us your requirements.

Light, Safe and Portable
Sturdy and Compact in Construction
Simple in Design and Inexpensive to Operate

These models have extremely high output for their size and weight. They are recommended for portable work on road and construction jobs, repair shops, fire departments; indispensable for lighting and operating of electric tools such as portable compressors, drills, saws, sanders, etc.

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TRACTOR SITUATION IMPROVED

More Allis-Chalmers Diesels in the smaller models are now tagged for civilian use. This largely means HD-7's, although HD-10's will also be available in greater quantity.

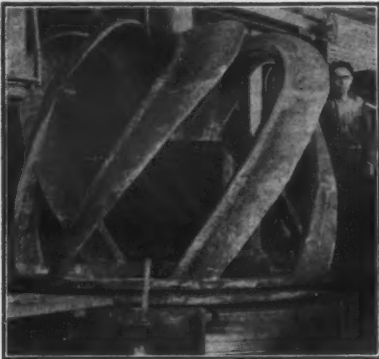
Because of the big demand, production will still be allocated—of necessity, essential users come first. This does, however, mean many more tractors to go around... an easing of the situation!

We are continuing our high production to more quickly satisfy essential needs. Let your Allis-Chalmers dealer help determine your eligibility.

With 60 drawbar h. p., the HD-7 gives you ample power to handle suitable 2- or 4-wheel scrapers, pusher loading, bulldozing and the pulling of graders, sheep-foot rollers, other equipment. Fast working speeds to hurry the job—up to 6.27 m. p. h. Electric starting and operation on Diesel fuel! 200-hour truck wheel and front idler lubrication!

ALLIS-CHALMERS

2-Cycle
THE MODERN
DIESEL POWER



The dredge Cartagena's seven-blade cutterhead gets a precision-finish grinding of the hub bore.

Building a Cutterhead For Hydraulic Dredge

The seven-blade cutterhead shown in the illustration was shipped to the Standard Dredging Corp., at New Orleans, La., for use on its tidewater-construction hydraulic pipe-line dredge Cartagena, which is used for harbor and river dredging and land reclamation. This Amsco manganese-steel plain basket-type rotary cutterhead for clockwise rotation was made with the back ring, blades, and hub cast integrally by the American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill. The photograph was taken when the precision finish grinding of the hub bore was in process at the machine shop.

The completed cutterhead includes a threaded bore attachment to its shaft. The composite design of the hub is novel and distinctive. Austenitic manganese steel, because of its extreme toughness, is very difficult to cut or thread. A pre-machined carbon-steel center was therefore employed for the threaded portion. This carbon-steel piece was securely locked in place. In the manganese-steel portion of the hub, the circular bore details include a shoulder collar at the rear face end for definitely fitting the hub center, which is set into its position with a shrink fit. The hub center is additionally secured in place with a heavily welded seam at the circular marginal edge of the front end face.

The threaded bore details incorporate the use of 55-degree Whitworth standard double right-hand threads, 1½-inch pitch, and 3-inch lead. The shaft size on the threaded portion is 13 29/32 inches outside diameter.

The weight of the completed cutterhead is 8,062 pounds and its overall length from the rear face of the back ring to the nose is 5 feet 11¼ inches. The back ring is 6 feet 4 inches inside diameter and 7 feet 3 inches outside diameter of heavy angle section 2 inches thick.

Study of Memorials On Public Highways

A Committee on Public Memorials has been created by the New Jersey State Highway Department to study proposals submitted to it for permission to erect public memorials within the right-of-way of state highways. This Committee consists of the Engineer of Permits, as Chairman, the Engineer of Survey and Plans, two members of the Bridge Division, two members from the Landscape Division, and one from the Administration Division.

In studying proposals, the Committee is endeavoring to determine whether the location will interfere with any contemplated or possible improvements or changes and whether there are any franchises, grants or easements, including subsurface utilities, which may be adversely affected by the construction of the proposed memorial. There is also the point whether the tenure of the State is such that a permit may be legally granted and whether the ease-

ment of the abutting owner for light, air, and access will be affected.

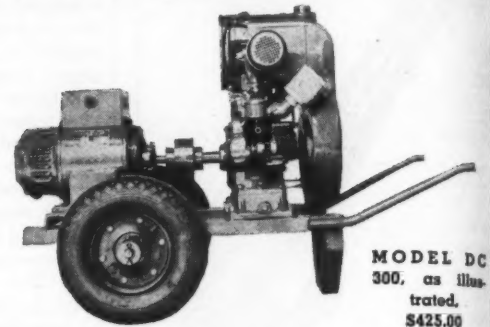
Other conditions which the Committee is studying with regard to each proposal are whether the plans submitted indicate that the structure will be sound, stable, and permanent; whether the materials of construction are appropriate; whether the memorial will be aesthetically and architecturally pleasing, and is suitable for the neighborhood or location. The foundation planting, landscaping and other appurtenant features of the memorial are studied to determine their correctness as well as what effect the memorial will have on highway maintenance. Care will be taken to determine whether the sponsors of the memorial or the applicant can be depended upon for the upkeep and maintenance of the memorial itself.

After the consideration of any application, the Committee is empowered to make recommendations, either favorable or otherwise, to the State Highway Commissioner.

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Diesel and gasoline engine driven light and power plants 2 to 50 K.W.

Floodlights and portable poles.

Rentals

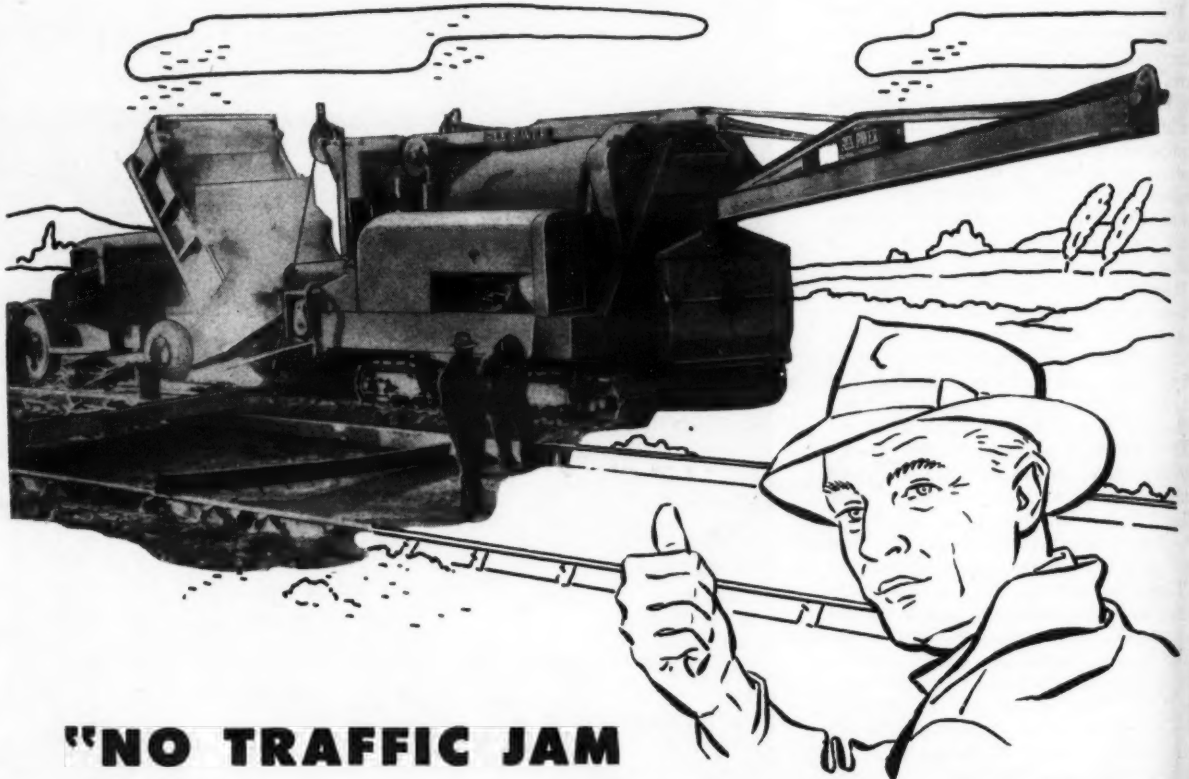
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"That Rex skip really keeps us moving right ahead because it gives us those extra few seconds of loading time that mean more batches per hour," says a well-known paving contractor.

Why, it's practically a "one-man ground crew" that kicks the batch into the drum almost faster than you can say "Jack Robinson." Then—zingo—the skip is back on the ground again and it stays there just long enough to give the exact time needed for dumping the next batch into the skip.

The operator is *not* required to turn the water on or off manually, he can drop the skip *faster* . . . permit it to remain on the ground those few seconds longer that mean more orderly loading, more yards per day.

And it's all made possible by the famous Rex Mechanical Man that automatically controls the batch transfer and entire mixing cycle right to a split second. It opens and closes the discharge door—it opens and closes the transfer door—it controls the water and it starts the skip upward—all in perfect timing and with valuable seconds saved.

RELY ON YOUR Rex Distributor. He handles the complete line of Rex equipment for speeding up the mixing, hauling and placing of concrete and the moving of water. See him for Pumps, Mixers, Pavers, Moto-Mixers and Pumpcretes. You'll find him always ready and willing to help you locate new and used equipment, and to help you keep your present equipment in top running order.



CHAIN BELT COMPANY of MILWAUKEE

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Role of Construction In Post-War Economy

Harvard Professor Tells ARBA Guests High Level of Construction Is Necessary to Maintain a High Volume of Income and Employment

CONSTRUCTION will play a great role in stabilizing America's national economy after the war, and road building will furnish a material part of the required construction volume, Dr. Alvin H. Hansen, Professor of Political Economy at Harvard and special economic advisor of the Federal Reserve Board, told dinner guests of the American Road Builders' Association in Washington, D. C., recently.

Dr. Hansen sketched the relationship between construction and business from the boom years of 1919-20 through the depression period of 1921-22 down to the present. During the depression which followed World War I, inventories fell off from \$4,500,000,000 a year to zero, net exports declined to one-sixth of the boom-year volume, and investments in equipment slumped more than 40 per cent.

The depression of 1921-22 was short-lived because construction ran at a high level of \$6,000,000,000 per year and, aided by the automobile industry, grew in volume in the latter part of the depression. The speaker held that the reason we had a sustained volume of income and employment in the 1920's was the \$12,000,000,000 of public and private construction carried on in that period.

The low business ebb of the '30's was due to the low level of construction which was only one-half of that of the previous decade, Dr. Hansen said. In planning for the coming post-war era, we must work towards capital outlays in construction projects that will provide outlets for the investment of private capital and furnish full employment.

America has experienced two great revolutionary cycles in the past century and both were brought on by construction, the Harvard economist pointed out. The coming of the railroad opened up new areas of national expansion from 1840 until 1875. Then for some thirty years we had a period of what Dr. Hansen termed "growing into the new technique". Towards the late '90's, there was a marked slowing down, with falling prices and new divisions of labor, causing industrial unrest.

At the turn of the century came another great wave of expansion, the era of electricity and the automobile. Again the whole structure of our entire economy underwent a profound change. This period was not unlike its predecessor.

After 1929-32 there was a decline in private capital outlay at the rate of \$15,000,000,000, that is from \$17,000,000,000 to \$2,000,000,000, and over half of this was in the field of construction. This really meant a decline of \$45,000,000,000 in our national income, the

speaker stated, as it meant a falling off of that amount of consumption expenditures.

Stabilizing Construction

Maintaining the construction industry on a high and stable volume of capital outlay will go far towards solving our problem of mass employment,

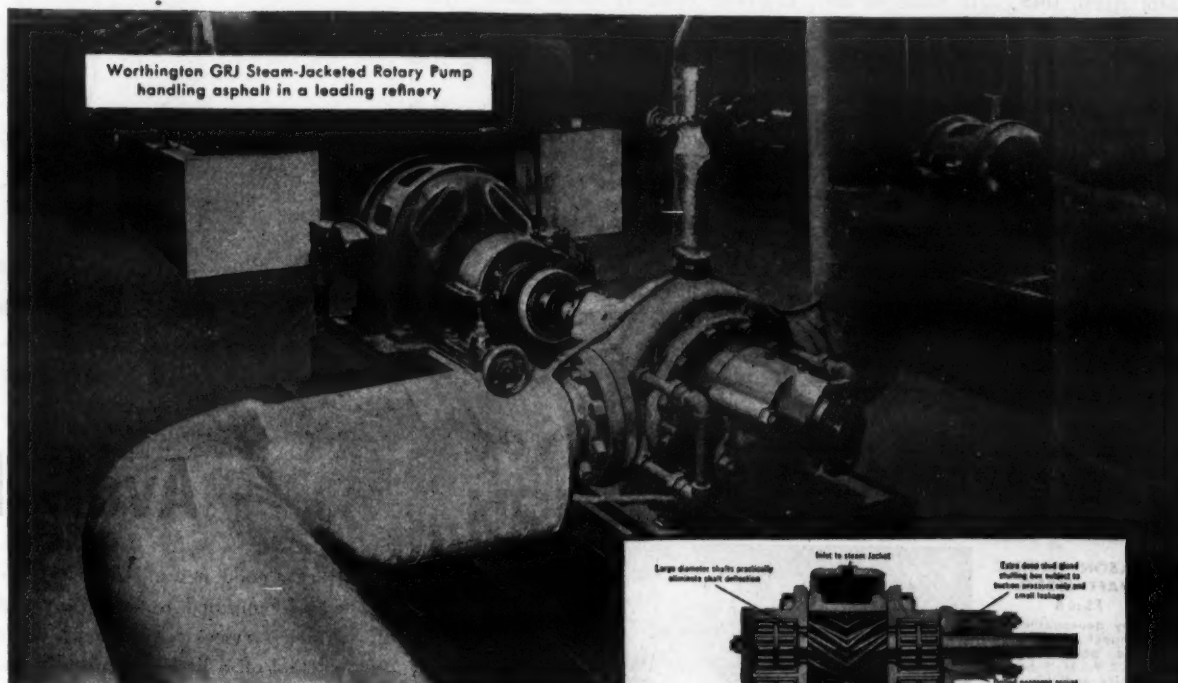
Dr. Hansen said. In planning for the future, we should be sure to provide private investment outlets that will put savings to work in an active, useful cause.

However, stabilizing the construction industry means more than building highways and houses, declared Dr. Hansen. Planning should comprehend

river valleys, forests, railways, public works, business plants, and scores of other things that must be developed, built, or maintained. He held that in the construction world, the next thirty years should be bright.

In conclusion, Dr. Hansen observed that highway building is a balance (Concluded on next page, Col. 3)

THE STEAM-JACKETED PUMP THAT GETS ASPHALT OFF TO A GOOD START



Worthington GRJ Steam-Jacketed Rotary Pump handling asphalt in a leading refinery

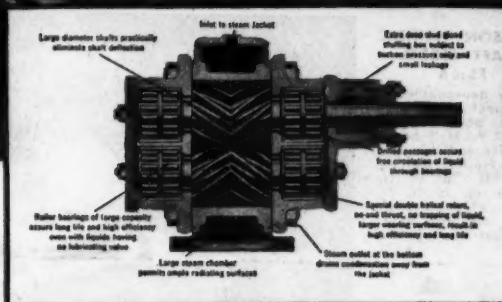
... is also your best bet at the finish

One thing contractors and refiners have in common is whole-hearted respect for the in-built stamina of Worthington Steam-Jacket Rotary Pumps. As a matter of fact, many contractors don't even know that Worthington GRJ Rotary Pumps are installed right in their road oilers, pavers, and trucks. That's because these dependable asphalt handlers have a habit of staying out of trouble... so never call attention to themselves.

That's why you'll want to have these same trouble-dodgers keeping asphalt on the go from tank cars to storage tanks to tank trucks to the machines that apply it.

GET ALL THE FACTS

For vital facts a contractor should know about Steam-Jacketed Rotary Pumps for handling asphalt, write for Bulletin W487-B11. It proves that there's more worth in Worthington. Worthington Pump and Machinery Corporation, Harrison, N. J.



WHY WORTHINGTON GRJ ROTARIES CAN TAKE IT

1. **ROLLER BEARINGS** with more capacity than any other rotary pump.
2. **STUFFING BOX** much deeper than the average.
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P 5-19



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Report on Progress Of 3,334-Mile Route

Some salient facts regarding construction progress on the 3,334-mile Inter-American Highway between Laredo, Texas, and the Panama Canal Zone have recently been issued by the Office of Inter-American Affairs. It is possible that dry-weather travel over this international route through Mexico, the five Central American republics, and Panama may be possible by December, 1947, providing construction funds are made available.

As of April, 1945, 1,515 miles of the 3,334-mile route were paved; 949 miles were classed as all-weather; 380 miles, as dry-weather roads; and 490 miles are trails. The breakdown by countries is as follows:

Country	Paved	All-Weather	Dry-Weather	Trails
Mexico	1,065	149	204	330
Guatemala	...	300
El Salvador	144	29	21	...
Honduras	...	67	16	8
Nicaragua	81	136	22	...
Costa Rica	61	81	117	124
Panama	162	187	...	28

At present there are no funds appropriated for constructing a highway in Costa Rica over the 99 miles of trail between San Isidro del General and the Panama border; for constructing a highway in Panama over the 28 miles of trail between the Costa Rican-Panama border and a point 5 miles north of Volcan, Panama; or for constructing a 110-mile alternate route between the Mexican border and Quezaltenango, Guatemala, via Huehuetenango.

The U. S. Public Roads Administration is carrying on road construction on three sections of the Inter-American Highway route in Costa Rica. These are 48 miles, 4 miles, and 25 miles, respectively, in length. The other countries are also doing considerable road construction on the Highway.

Although no official date has been set for the completion of the Inter-American Highway, it has been stated that, providing funds are made available, it might be possible to travel the full length of the route in the dry season by October or December, 1947.

Role of Construction

(Continued from preceding page)

wheel in the construction industry and that a well-planned long-range program, extending far into the future, would do much to stimulate the flow of investment, motivate production, stabi-

lize business, and relieve unemployment. He added that the preparation of plans now is essential, and that these plans should vary materially in size and extent. Some should be for long periods, some intermediate and some short time, but as a whole they would be able to meet conditions as they arose.



Available Now

Here's good news. Now that the war is confined to one front and armed services requirements have slackened off a little, a limited number of Insley Excavators are available to civilian buyers upon authorization of WPB. The first Insley released to a civilian contractor since 1942 already has been delivered and more will follow.

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JACKSON FLEXIBLE SHAFT VIBRATOR MODEL FS-4A

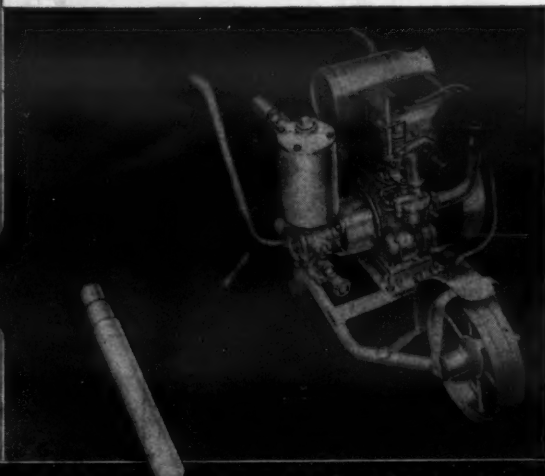
Excellent for thin walls, tight, narrow places, and between reinforcement. 110-120 volt AC, DC, 1500 V.P.M. Head 1-13/16" x 17" x 10". Shaft lengths 24", 29", 7 ft. and 14 ft. Light-weight motor, easily held by operator.

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Our long famous "JACKSON" line is comprised of time-tested, thoroughly dependable vibrators (internal and external types) ideally applicable to every type of concrete construction and placement: dams, bridges and buildings, floors, walls, columns, pavements and pipe manufacture; also many vibrators which may be adapted with great advantage to the conveying, movement or packing of various materials. To get the vibratory equipment which will show you the greatest possible return on your investment, write, stating your particular problems. We will be glad to give you the benefit of our many years of experience as specialists in the application of high-frequency vibration. Get the facts! It involves no obligation whatsoever.



ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN

Need Larger Levees For Flood Control

Serious Damage Avoided By Dam and Reservoir but Unusual Heavy Rains Prove Local Levees Inadequate

WAPPAPELLO Dam, constructed in 1941 on the upper reaches of the St. Francis River, undoubtedly prevented serious property damage and loss of life in southern Missouri and northwest Arkansas last spring when unprecedented rains taxed to the breaking point the substandard local levees along the river below the dam. Although a number of levee breaks did occur, the damage was limited mainly to an area of some 10,000 acres east and north of Paragould, Ark. Without the 18-mile-long Wappapello Reservoir, with a storage capacity of 625,000 acre-feet of water, to absorb the flow of the flood-swollen river, a general flooding and re-flooding of the St. Francis River valley would have occurred during the early months of 1945.

The St. Francis River rises in southeastern Missouri and flows south through Arkansas, roughly paralleling the Mississippi River which lies about 60 miles to the east. The distance between the confluence of the St. Francis with the Mississippi near Helena, Ark., and the Wappapello Dam, about 60 miles due west from Cairo, Ill., is about 109 miles along the course of the river. Most of this section is protected by levees, except the 97-mile stretch just above the mouth of the river where the backwaters from the Mississippi must have plenty of area in which to disperse. Constructed by local interests, these levees vary in height from 2½ to 12 feet, depending on the ground elevation, and in composition from very sandy soil to heavy gumbo, depending on the type of soil available in the immediate locality. The lowest of these levees are termed "potato ridges", and the sandy sections of both low and high levees are subject to much seepage.

For the past four years the U. S. Engineer Office of the War Department, Memphis District, has wanted to build, along the St. Francis River below the dam, the larger and stronger levees which form an integral part of the project as authorized by Congress and which are necessary to the full protection of the basin. However, local interests have so far failed to provide the

right-of-ways necessary for the construction. The law under which the project was authorized requires that the local interests must furnish the land for the levee right-of-ways and agree to maintain the completed works after their construction by the Federal government. The U. S. Engineers calculate the flow lines and determine the width needed between levees, and the local levee districts are then responsible for obtaining title to the strips of land required for levee construction.

Local Levees

Agricultural land along the St. Francis River is productive and valuable, and property owners have been consistently reluctant to part with any of it, even for the protection they want

and expect. Since set-back levees would take a certain amount of acreage which can be used for raising crops, the local interests have been pinning their hopes on the 2,700-foot-long earth dam at Wappapello to prevent flood waters from rushing down the river valley. The experience this spring has demonstrated conclusively, however, that the dam alone cannot provide complete protection to the basin and that full protection can be assured only by completion of the complementary project levees below the dam.

Practically all of the land between the Mississippi River and the St. Francis, below the latitude of Wappapello, lies within the drainage basin of the latter river, for in this section there has been a natural silt deposition along the Mississippi to form a high river bank, causing precipitation to drain westward to the St. Francis. There is thus a considerable tributary area draining into the St. Francis below the Wappapello Dam from which the run-off is entirely uncontrolled. Until the existing levee

system below the dam has been enlarged and strengthened to hold the inflow from this area, coupled with the design outflow from the dam, the dam cannot be operated to the full extent of its efficiency and cannot solve the problem of flood waters caused by unprecedented heavy rains in the river valley.

From February 13 to June 22 of this year there fell on the drainage area above the dam a total of 44.95 inches of rain, while below the reservoir in the valley the rainfall during the same period amounted to 46.30 inches, exceeding the average annual rainfall for that area by more than 3 inches. During the week of February 21-27 more than 6 inches of rain fell on the reservoir and drainage area above the dam. A series of storms which followed in rapid succession throughout the month of March completely exhausted the storage capacity of the reservoir and resulted in uncontrolled discharge over the spillway on two separate occasions. Ex-

(Concluded on next page)

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The drainage basin of the St. Francis River in Missouri and Arkansas.

Larger Levees

(Continued from preceding page)

haustion of storage space would not have occurred had the levees been constructed so that the stored water could have been released according to plan. The concrete spillway of the dam was first overtopped on March 31 and then again on April 14, with crest elevations of 397.43 and 399.31 occurring on April 3 and 16 respectively. The spillway is at elevation 395 and the top of the dam at 420 mean sea level. The conservation-pool weir limits low pool to elevation 355. Three gates in the control structure of the dam regulate outflow from the reservoir which, under completed project conditions, would be around 10,000 cfs, but which has had to be drastically reduced due to the inability of the substandard levees to withstand a sustained outflow of this amount coupled with uncontrolled run-off from the tributary area below the dam.

Regulating Flow

To ease the burden on the substandard levees, U. S. Engineers were forced to reduce the outflow from the reservoir as much as possible, cutting it down to as little as 2,000 to 3,000 cfs and at times shutting off flow altogether. With almost continual rains producing tremendous inflow peaks from the 1,310 square miles of drainage area above the dam, the water-storage space in the reservoir was exhausted and uncontrolled flow over the spillway resulted on the two occasions previously mentioned. Probably a major flood catastrophe was averted only by the modifying effect of valley storage in areas adjacent to the river immediately below the dam, and the non-coincidence of peak flows from the reservoir with maximum run-off from the uncontrolled area below the dam. A glance at the eleven peak inflows into the reservoir within a period of four months indicates the unusual amount of water that had to be dealt with. The inflow peaks were as follows:

No.	Date	Peak Inflow (cfs)
1	Feb. 22	16,700
2	Feb. 26	33,000
3	Mar. 3	16,400
4	Mar. 6	39,700
5	Mar. 20	25,400
6	Mar. 26	22,400
7	Mar. 31	47,800
8	Apr. 2	29,200
9	Apr. 15	89,000
10	June 9	91,000
11	June 17	31,000

*Preliminary and subject to correction

The peak flow of 89,000 cfs on April 15 resulted in a record elevation of 399.3 at the dam on the following day. The U. S. District Engineer Office at Memphis, preparing for the worst, had thousands of sacks to be used for sandbags shipped to various points along the levee where local interests were working to build up and reinforce the sodden levees. By this time the flow of water over the spillway of the dam could no longer be regulated by the Engineers. The fact that much of this water entered temporarily into the vast natural storage area below the dam, from which it later slowly returned to the river, largely accounts for the fact that a major flooding of the valley did not result.

During May the rainfall was relatively light and by June 7 it had been possible to reduce the reservoir level to 360.1. Another great storm then occurred (precipitation amounted to 9.32 inches in the period June 6-11) which caused a rapid rise in the lake level and produced the maximum inflow rate on record, 91,000 cfs, on June 9. Fortunately there was sufficient storage capacity available in the reservoir to absorb the run-off from this storm without overtopping the spillway again. Further rains which followed combined to produce a crest elevation of 392.88

on June 21, and spillway action for a third time was narrowly averted.

Levee Failures

On April 8, the first break in the local levee occurred on the Missouri side of the river west of Senath, Mo. Then on April 16 a break occurred east of Paragould, followed by another 3 miles upstream. Overflows in this section of the St. Francis are not uncommon and, as some breaks in this area were anticipated at the time, there was no loss of life or stock. To date some nine levee breaks have occurred. The Engineers have been at work in the area making emergency box closures of the most serious breaks in an effort to restore some of the overflowed land to cultivation this season.

U. S. Engineers of the Memphis District are hopeful that the narrow avoidance of a real catastrophe experienced by residents of the St. Francis River valley will make them realize that the up-river dam alone will not afford them protection if the inadequate down-

stream levees are not only increased in size but also set back to give the river more width in which to expand during flood stages. The Government engineers stand ready to build new levees just as soon as the local levee districts acquire and make available to them the necessary right-of-ways for the construction.

Flood control of the St. Francis River is under the jurisdiction of the Memphis

Engineer District of which Colonel Garner W. Miller is District Engineer and the work is prosecuted under the supervision of Brigadier General Max C. Tyler, President of the Mississippi River Commission, Vicksburg, Miss., under the direction of Lieutenant General Eugene Reybold, Chief of Engineers, U. S. Army.

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The above is quoted from a Barrett Tarvia advertisement in The Saturday Evening Post.

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The new 6-S Kwik-Mix Dandie mixer, now on the market, has a number of new features.

Kwik-Mix Announces New Mixer Models

A new 1-bag concrete mixer, the Kwik-Mix 6-S Dandie, went on the market June 1, and is soon to be followed by new 16-S and 11-S models, according to the Kwik-Mix Co., Port Washington, Wis. All of these models are welded throughout and utilize high-strength steel extensively. The new selective skip shaker does not engage until the skip is partially emptied and really ready for shaking.

The controls of these mixers are conveniently located for high-speed operation and the new 6-S is reported to be well balanced on automotive-type leaf springs and pneumatic tires, trails fast, and handles easily. It mixes 6 cubic feet of concrete plus 10 per cent and complies with AGC standards for this new size which replaces the 5-S and 7-S sizes.

Complete information may be secured direct from the manufacturer by mentioning **CONTRACTORS AND ENGINEERS MONTHLY**.

Books for Builders

For those of our readers whose construction activities take them into the building field, we are glad to review two new books covering estimating and the value of modern building codes in fire protection.

"Building Construction Estimating" is the title of a 282-page book by George H. Cooper, Instructor in Charge of Estimating Classes, Mechanics Institute, New York. This is a very complete discussion of the specific handling of the essentials in estimating for building construction, without too great detail. It contains all of the required material, including two sets of plans and outline specifications, many specification estimates, and numerous illustrations, questions, and exercises. After a series of general chapters covering construction relations, the architect, the contractor, plans and plan reading, contracts, and the technique of estimating and quantity surveying, the book successively discusses excavating; concrete foundations; concrete floors and roofs; masonry work; rough carpentry; cement work; plastering; finish carpentry; steel and iron; roofing and sheet metal; stone work; fireproof doors and windows; tile, terrazzo, and marble; painting, glazing, and hardware; and the mechanical trades. This book is published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y., and is priced at \$3.00.

"Fire Protection Through Modern Building Codes", by L. B. Wood, Consulting Engineer on the staff of American Iron & Steel Institute, publisher of this volume, is a 244-page book designed to give a better understanding of the fundamentals of fire-protection regulations and to provide information on the nature and severity of fire hazards. Many regulations that appear in current building codes were originally written many years ago. The limited

knowledge and meager technical data then available were utilized to regulate the materials of construction then in vogue. Many of those regulations have since been copied from code to code, but are now antiquated and obsolete. A limited number of copies of this book are available without charge to those who write on their business letterhead to American Iron & Steel Institute, 350 Fifth Ave., New York 1, N. Y.

Rural-Road Program

Bill S. 1022, introduced by Senator Stewart, would provide a \$1,500,000,000 highway program for rural roads and village streets in the first three post-war years, the Federal government to put up \$375,000,000 and the states \$125,000,000 annually, on a 75-25 matching basis. The administration of these funds would be under the Rural Roads Control Administration of the Federal Works Agency. The measure has been referred to the Senate Post Offices and Post Roads Committee.

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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Acts Under a Contract Can Outweigh Wording

The old saying that "Actions speak louder than words" is often given weight by the courts. The point usually comes up where one party to a contract insists that a lawsuit be decided strictly according to the written terms of the agreement, although both of the parties may have disregarded one or more of those terms.

For example, a quarry company contracted to furnish to a contractor at specified prices all the stone required to complete two jetties for Uncle Sam. The principal parts of the contract were typewritten, but there was a printed clause to the effect that deliveries must be ordered before December 1, 1942. (The contract was dated August 6, 1942.)

When the quarry company sued for a balance due for rock delivered, the contractor counterclaimed for damages caused by the quarry company's failing to deliver all the stone required on the job.

The New Jersey Court of Errors and Appeals decided that the contractor had a valid counterclaim, although the undelivered stone was not called for until after December 1, 1942. (Kingston Trap Rock Co. v. Eastern Engineering Co., 39 Atl. 2d, 422.) The court said that, even if the printed clause limiting the time for deliveries be deemed a part of the contract, the fact that the quarry company made deliveries for several months after December 1, 1942, amounted to a waiver of the time limit. The court inferred from the circumstances that both parties by their acts after December 1 treated their contract the same as if that clause never had been part of their agreement.

State Was Held Liable For Misrepresentation

The ancient rule that "the king can do no wrong" has no place in the law of this country, although it is true that there is no legal remedy against the United States or a state for a wrong committed, excepting as the state or Federal government consents to be sued.

The State of New York has established machinery under which it may be held accountable to public contractors for breach of contract, etc., on substantially the same basis as a private owner could be held liable. So, it happened that in the case Vandewater v. Flushing National Bank, 46 N. Y. Supp. 2d, 35, to which the State was a party, it was held liable for \$32,844.74 damages resulting from improper concealment on the part of its officers and agents as to subsoil conditions. The Appellate Division of the New York Supreme Court upheld an award of the State Court of Claims, saying:

"The action is based upon the fraud and misrepresentation of the State in entering into a contract with claimant Vandewater. The contention of the claimant is that he was induced to enter into a contract for the erection of a plate-girder bridge over the Wallkill River upon the representation of the

State that the excavation work was an ordinary operation; that such representation was false because the existence of quicksand made the excavation a complicated, prolonged and expensive operation; and that the State knew of the falsity of its representations from the fact that its own boring tests made a few months before the contract was let revealed the existence of quicksand. It is not denied that the State withheld the information obtained from these borings from the contractor."

Contract Contradictions Lead Into the Law Courts

We have before us the copy of a contract for the sale of unmined gravel. From a standpoint of smoothly reading legal terminology, it is a masterpiece, with well balanced "whereases" hanging from it like ornamental pendants. But, sad to relate, it took a lawsuit

to determine what it meant. All of which goes to show that an informally worded agreement that leaves no doubt as to its meaning is to be prized above elegantly worded ambiguity.

One paragraph of the contract in question recited the sale to the second party of all the gravel deposits located on a described tract of land. But the next paragraph declared that the second party "shall have the right to enter upon said land for the purpose of removing said gravel for a period of five years" from the date of the contract.

After the five-year period had expired, the landowner, the first party, granted gravel removal rights to third parties, who sued to enjoin the second party from interfering with such removal. The second party unsuccessfully defended the suit on the ground that it had bought all the gravel on the tract. (Harjo Gravel Co. v. Luke-Dick Co., 153 Pac. 2d, 112.) The Oklahoma Supreme Court declared that it was impossible to determine from the face of the document whether it was an outright sale of the gravel or a mere contract for the sale of as much gravel as the second party might remove within five years. Therefore, it was proper to consider the intention of the parties as indicated by the nature of the negotiations leading up to the execution of the contract. Viewed in that light, it was decided that the second party's rights were mutually intended to, and did, terminate when the five-year period expired.

Test of Responsibility Of Low Bidder for Job

That a bidder for public work, presenting the lowest proposal, is slated to lose money on the job does not in itself warrant a conclusion that he is not the lowest "responsible" bidder, within the meaning of a legal requirement that the award be made to the lowest responsible bidder.

Nor does the mere fact that the lowest bidder has never previously done work for the public agency letting the contract make him an irresponsible bidder.

Before the lowest bid can be chucked out on the ground that it is not a responsible one, the bidder has a right to be heard on that point, and there must be a sound basis for ruling him out as not being responsible.

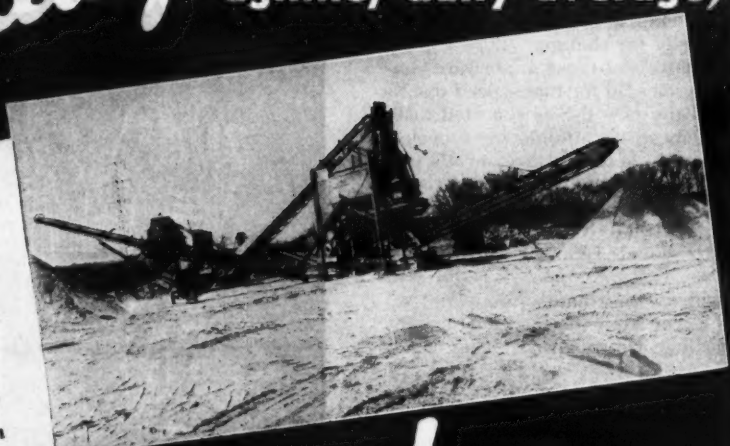
So decided the New Jersey Supreme Court in the case Sellitto v. Cedar Grove Township, 38 Atl. 2d, 185. But the court did recognize that where performance of a given job requires special experience, the question whether the lowest bidder possesses that qualification is one test of his responsibility. Said the court, in part:

"Sellitto's sound financial condition and moral integrity are not in dispute; and, since that is so, the concern of the Commission over his taking the job without profit rather loses force. It may well be, as he said the

(Concluded on next page)

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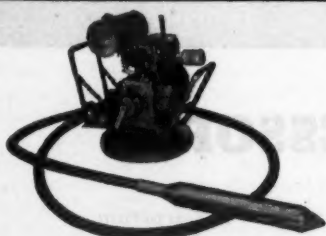
Photos courtesy Eighmy Equipment Co., Rochelle, Ill.—another "live wire" Universal dealer!

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ELKHART INDIANA

Avoid Legal Pitfalls

(Continued from preceding page)

fact was, that he would make his profit on other jobs that would work in with this contract."

Agreements to Choke Competition Are Void

When a contractor becomes aware that the effect of an agreement which he is about to make will be to stifle free competition in a bidding field, he should "stop, look and listen". He is approaching dangerous ground. In the case of Uvalde Construction Co. et al (appealing defendants) v. Shannon (appellee-plaintiff), 165 S. W. 2d, 512, decided by the Texas Court of Civil Appeals at Eastland, Shannon had sued two construction companies for breach of an oral agreement or contract claimed by him to have been made with the defendants for their purchase from him of all caliche to be used by the defendants in constructing roads, streets, etc., in and around Camp Bowie, Shannon in turn agreeing not to furnish information on caliche to other possible bidders.

Declaring the contract to be void, the court said:

"It seems clearly apparent from the contract, as the provisions are thus alleged in plaintiff's petition, that plaintiff obligated himself not to furnish information concerning caliche to competitors of defendants and not to sell caliche to such competitors in order to enable defendants to procure the [construction] contract on terms more favorable to them. * * * The public good required that the contract be let upon the best terms, from the standpoint of the authority letting the contract, which free competition would manifest. The contract in question [between plaintiff and defendants] undoubtedly tended to lessen competition and thereby enable defendants to submit the best bid upon terms less favorable to the public than would have been the case in the absence of such contract."

Third Party's Right To Sue on Contract

The courts often have decided that although a particular contract was made between two parties, the nature of the agreement was such as to show it was intended to be for the benefit of a third party. In such cases the third party has been upheld in suing to enforce the contract.

But the mere fact that a contract contemplates partial performance through some third party does not necessarily give him the right to sue. This is shown by a New Jersey case, where a quarry company agreed to furnish to a contractor all of the stone needed in constructing two jetties for the Government. The quarry was located at K., but the contract referred to shipments from L., a town where another quarry company had its plant. (One person owned a majority of the stock of both companies.) The second quarry company sued to collect for stone delivered by it to the contractor, but the New Jersey Court of Errors and Appeals decided that it had no standing in court—that if either corporation had a right to collect it was the company with which the contractor had directly contracted. The court said that while some stone was furnished under the contract by the second quarry company directly to the contractor and was paid for directly by the contractor to that company, this was done on the orders of the first company and not at the instance of the contractor. (Kingston Trap Rock Co. v. Eastern Engineering Co., 39 Atl. 2d, 422.)

Who Are Protected By Contractors' Bonds?

One Larson spread gravel on a road in the course of construction, but his relationship to the job was not close enough to enable him to enforce a claim against the general contractor or that contractor's bond for what was due him from a material man on account of such services. So decided the Indiana Appellate Court in the case of State v.

Warren Bros. Roads Co., 59 N. E. 2d, 912, in applying governing Indiana statutes.

The defendant company contracted with the State of Indiana to build a section of road, and gave a statutory bond to secure payment for all lawful claims of subcontractors, material men and laborers furnishing materials or labor used in completing the

job. A subcontract called for furnishing, delivered along the job site, all crushed stone needed. Larson, under employment by the subcontracting material man, used his own truck in hauling and spreading some of the crushed stone. Not having been paid for this service, he sued in the name of the State to hold the general contractor and its surety liable on the above-mentioned bond. The trial court decided that those defendants were not liable and the Appellate Court upheld the decision.

The Appellate Court adopted reasoning quoted from a decision of the United States Supreme Court, to the effect that a general

contractor's bond reasonably may cover claims of those furnishing labor or material to a subcontractor, because the general contractor can protect himself by taking a bond from the subcontractor for payment of those claims. But, as pointed out by the Supreme Court, it is not generally feasible for the general contractor to protect himself against claims for labor, etc., furnished to a material man, as in this case. Therefore, the Indiana court in effect decided that a contractor's bond should not be read as making him liable to persons so remotely related to the job, in the absence of clear wording to that effect, in the bond or the statute requiring the bond.



Rugged simplicity, always the basis of Euclid design, helps to keep hauling costs down because there is a minimum of wearing parts. Built to do one specific job... off-the-highway hauling of earth, ore, rock and coal... Rear-Dump and Bottom-Dump EUCLIDS cost less to own and operate.

With top speeds of 21.8 to 34.4 m.p.h.... carrying 15 to 30 ton payloads... Euclids move more yards or tons per day on both short and long hauls. For dependable, low-cost hauling on the toughest jobs... in mines, quarries, construction work and industrial material handling... rely on Euclid simplicity and hauling speed coupled with efficient digging and loading equipment.

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On the Rud-O-Matic Combination Magnet Reel and Tagline, both drums revolve together. In attaching the electric magnet cable, a little slack is allowed. The tagline cable is attached with sufficient tension to steady the magnet. Both cables then feed back and forth in the same relation as originally set. An inner spring on the reel drum provides the tension. With this equipment there is no chance for the electric cable being pulled apart or jerked loose from connections.

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Traffic Should Be Guide To Highway Planning

Survey of Highway Use As Well As Terrain Essential in Planning and Design of New Highways; Roads Must Be Built for the Future

By HERMAN A. MacDONALD, Commissioner, Massachusetts Department of Public Works

THE correction of traffic faults is no different from the diagnosis of an illness by a physician. A survey of things as they are is the primary essential. A highway survey must first be made, not necessarily by instruments, but a visual survey of the situation and a study of traffic, present and potential, the terrain and grades, and sight distances, to determine the kind of construction necessary to move traffic quickly and yet safely. Having secured all the traffic data by the various methods which have been developed through the years, and by applying that data to the particular problem, we can plan and design our highways in a scientific manner, rather than just go ahead and build another road.

Highway Planning

To learn these traffic needs, the Highway Planning Surveys carried on exhaustive studies:

1. The existing facilities, including the length, width, type, and condition of all highways, have been determined; highway structures and grade crossings have been measured.

2. There has been determined the amount of traffic using these facilities and the daily and seasonal traffic pattern and trends, the percentage of trucks, the weight of loads, the purpose of travel, and a forecast of traffic.

Having analyzed these data, the highway engineer now has a vast amount of factual material which heretofore was not available to him.

We already have a system of highways, and our problem now is to know to what extent the roads which make up this system are capable of caring for present-day and future traffic needs.

In studying highway problems, it may be well to divide them into three categories:

1. The strictly rural job where the points between which traffic desires to travel are well known and the problem is merely one to determine the adequacy of the existing road.

2. The rural and small urban job where the highway is interrupted by a small city or fair-sized town and the problem is to determine how much traffic desires to enter the town and how much would by-pass it if the means were provided.

3. The large urban or metropolitan job where several rural trunk lines converge like the spokes of a wheel. The problem in these places is usually an internal one. The existing city

streets which pass through large industrial, shopping, or residential areas are already overburdened with problems of congestion and parking, and are incapable of satisfactorily caring for the heavy volumes contributed by the rural trunk highways.

Traffic Study the Key

Since traffic is the cause of these problems, the solution of them can be obtained only by a study of traffic. From the facts thus obtained, three fundamental questions applicable to the three types of jobs previously described

can be answered: 1. Is the improvement necessary? 2. Where should it be located? 3. What should be its capacity?

In the first step, average daily traffic volumes can usually answer this question by comparing the volume with the

(Concluded on next page)

WORKS LIKE A TROJAN

Capacity to do the work of several husky men makes a Barco Portable Gasoline Hammer a time and money saver on any job of breaking or drilling. Tireless and rugged, this easily handled tool has the sturdy construction to sustain long punishment when the going is particularly tough. Eleven special tool attachments. *Try One*

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- ★ Buy War Bonds
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Traffic Should Be Guide To Highway Planning

(Continued from preceding page)

surface width and determining the extent to which the highway in question is overburdened. Furthermore, with such data available on all our highways, each inadequate section can be compared with others, and a logical priority construction program arranged whereby it will be assured that the worst conditions will be corrected first.

In the second step, location, there frequently is no problem in the case of the strictly rural job. The need for seeking a new location for these rural highways is occasioned only when the volume becomes so great that a six-lane divided roadway will not accommodate it or the cost of improving poor alignment is prohibitive. In these cases, a new location is required.

In the case of the rural or small urban job, the matter of location is important and can be determined only by an origin and destination study of the traffic on the main-line route. Such a study will determine the percentage of traffic that desires to enter the town and the percentage that passes through it only because there is no alternate route around. From these data can be determined whether the contemplated improvement should go through the town or by-pass it.

In the case of the large urban or metropolitan job, the matter of location is of vital importance. In these areas, traffic problems are intricate, and highways to solve them are costly inasmuch as they require wide layouts through expensive property and are necessarily of a high-type design. Accordingly, it is imperative that location of any contemplated highway improvement in these areas which link the rural system with the urban should be thoroughly studied. Complete origin and destination studies of traffic will determine where traffic desires to enter and leave the city, and where it goes after it does enter. Such a study, therefore, properly locates the point of connection at the edge of the area, and further determines the location of the arteries to be constructed within the area.

After having determined the need for and location of the job, the third question of capacity pertains to design. Average daily volume figures are usually satisfactory for indicating the need for a job, but are of little value in the matter of design. To plan a highway which will be commensurate with the kind and amount of traffic it must serve, and one which will endure throughout its life expectancy, a more detailed study of traffic must be made. This involves an analysis of the frequency and duration of hourly, daily, and seasonal peak traffic periods. From this information, the number of required travel lanes can be ascertained. Actually it is the hourly figure which determines this item of design. By knowing the hourly flow and the number of hours occurring daily, weekly, or annually when the volumes exceed the capacity of the existing facility, an adequate width of surface for the new road can be readily planned.

Studies of truck traffic, as regards weight and frequency of heavy loads and the dimensions of commercial vehicles, provide data from which can be determined the type and design of the pavement, the required strength of structures, the width of travel lanes, and the necessary horizontal and vertical bridge clearances.

Predicted Traffic Growth

An estimate of what the traffic will be 10, 15, or 20 years hence provides the highway planner with data which have a two-fold purpose:

1. For those roads which he knows are inadequate at the present time, he can project his new design sufficiently to forestall unnecessary early obsolescence.

2. For those roads now adequate, he can estimate how long it will be before they become inadequate, and thereby gauge the progress which should be made to improve our highway system in order to keep pace with the requirements.

In Massachusetts, a forecast of traffic which has been made indicates that, 20 years after the return of 1941 traffic volumes, traffic will increase 44 per cent. This estimate has been conservatively prepared, and planners of post-war highways may reasonably expect that there will be at least 50 per cent more travel on our highways 20 years after the war. This increase is an inclusive estimate for all roads. Since it is a fact that the rural state highways and urban streets carry the bulk of the traffic, it is only reasonable to expect that the rate of increase will be greater on

these more important roads and plans should be made accordingly.

From a paper presented before the Second Highway Traffic Conference of the Eno Foundation for Highway Traffic Control in New York City, May, 1945.

New Tractor-Loader Also Dozer, Snow Plow

A new frame assembly for mounting on track-type 20 to 60-hp tractors, plus a bucket, a bulldozer blade, or a V-plow, and a power control unit make up a new combination outfit particularly advantageous to highway departments. The attachments are made according to the sizes of tractors and whether they have standard or wide treads.

For a standard-tread tractor of 35 to 60 hp, the bucket has a $\frac{3}{4}$ -yard capacity, and is 72 inches long, with an overall height of 9 feet 8 inches for the frame. The clearance under the bucket when dumped is 7 feet 6 inches. For this same frame assembly, the bulldozer measures 84 inches wide x 36 inches high, and the V-type snow plow is 10

feet wide. The frame assembly weighs approximately 3,700 pounds, the bucket 570 pounds, the bulldozer blade 820 pounds, and the snow plow 2,200 pounds.

A special illustrated folder containing descriptive matter and specifications of this Henry quick-detachable combination loader, bulldozer, and snow plow may be secured direct from the Henry Mfg. Co., Salina, Kans., by mentioning this news item.

Pettibone Mulliken Corp.

Appoints Sales Director

John Grolund has been made Director of Sales in the Construction Equipment Division of the Pettibone Mulliken Corp., Chicago, Ill. He will give particular attention to the PMCO line of shovel dippers, backdigging dippers, and dragline and clamshell buckets which are now in full-volume production. Mr. Grolund was formerly connected with LaPlant-Choate Mfg. Co. and the Buckeye Traction Ditcher Co.



The illustration above shows the cutting of a spline in a LIMA vertical swing shaft. Spline cutting requires costly precision equipment. It also requires longer time to complete the job—but when finished a more accurate fit, greater strength and longer life to the part is obtained. A keyway or a square shaft, would in a fashion, serve the same purpose but the reversing torques or repeatedly applied torque would rapidly weaken the keyed or square shaft, consequently delays and costly repair bills would result. Splines cut from the solid is standard practice with LIMA. Not only do splined shafts have greater strength, but they also assure a positive union between the driving and driven part. They also make it possible to separate the parts without damage to either part. Tomorrow when you will be buying new material handling equipment be sure it is a LIMA and get greatest value from your investment.

SPLINED SHAFTS

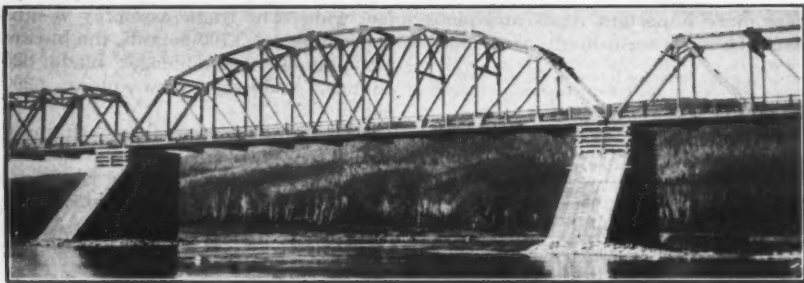
A good feature to have in a...
SHOVEL, CRANE or DRAGLINE

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SHOVELS, $\frac{1}{2}$ YD. TO 5 YDS. CRANES, 13 TONS TO 100 TONS
DRAGLINES, VARIABLE



This first bridge ever constructed over the Allagash River in the heart of the Maine fishing country was prefabricated, knocked down, pressure-treated, and then transported by rail and truck to the isolated erection site.

Prefabricated Bridge In Isolated Location

The first bridge across the Allagash River in the heart of Down East fishing country was completed recently. The prefabricated wood through-truss structure was built by Walter V. Mitton, Inc., of Augusta, Maine. The shovel to start the work on the far side had to be ferried across the stream as there was no other crossing. Materials for the bridge, after being shipped to St. Francis, Maine, by freight, had to be trucked more than 13 miles to the bridge site, about ¼ mile from the junction of the Allagash and St. John Rivers in Allagash Plantation, Maine.

This is the first time in the history of Maine bridges that a structure has been prefabricated, then knocked down, pressure-treated, and shipped to the erection site. In the superstructure is 123,000 feet of Douglas fir treated at the Port Newark plant of the American Lumber & Treating Co., and fabricated for connector construction by Weyerhaeuser Timber Co., according to plans prepared by the Bridge Division, Maine State Highway Commission. Two 160-foot trusses, four 120-foot trusses, floor beams and bracing, after being fabricated and marked for assembly, were pressure-treated with Wolman salts.

In the substructure are 65,000 feet of logs, 12,000 pounds of drift pins, and 800 cubic yards of stone fill for the log piers and abutments. The abutments are native-cedar log cribs riplapped to about 20 feet above low water. The piers are stone-filled cedar log cribs 35 feet high.

Erection was carried out on a false-work of spruce piling, tied and braced. A 3-ton stiffleg derrick was used to swing logs into place on the piers. It was also used with a scale box to hoist the rock fill into place for the cribs. A bulldozer, a 2-ton stiffleg derrick for the superstructure, and the gas shovel ferried across the river before construction began comprised the balance of the equipment.

Walter V. Mitton acted as his own Superintendent on the job, with Merritt G. Tibbets as Assistant Superintendent. G. Lewis Johnson was Resident Engineer for the Maine State Highway Commission, with Miram Malcolm as Assistant. Max L. Wilder is Bridge Engineer and Charles A. Whitten, Construction Engineer of Bridges for the State Highway Commission.

Safety Valve for Use On Air-Tool Lines

Over-age hose and worn connections are being used today far beyond their normal life because replacement is difficult. Protection against the costly and frequently dangerous whipping action resulting when a high-pressure air hose breaks, or a connection fails, is offered by the Limit-Flo safety valve made by the Associated Valve & Engineering Co., 510 No. Dearborn St., Chicago 10, Ill.

The Limit-Flo safety valve closes the line when the flow of free air exceeds a predetermined amount. It is installed immediately ahead of the upstream end of the supply hose. The standard Model 1,000 is designed to deliver a flow of air up to 100 cfm at 85 psi through a ¾-

inch hose up to 100 feet in length, but closes the line when the flow exceeds 100 cfm. Models for other pressures and capacities are available, and no adjustments are necessary after installation of the proper model in the line.

Limit-Flo safety valves are recommended for use on air lines for concrete breakers, air drills, grinders, sinker drills, drifters, and similar pneumatic tools and equipment. Further details on these valves may be secured direct from

the manufacturer. Just mention this publication.

High-Angle Dumping For Fast Unloading

For delivery of ready-mixed concrete from steel dump bodies, a high dumping angle is essential. It is equally true that this also speeds the dumping of all materials. The 70-degree dumping angle of Daybrook double-acting Hi-Dumper hydraulic hoists permits delivery of air-entrained concrete to wheelbarrows or concrete buckets direct from the truck body through its special clamshell-type discharge gate.

This hydraulic hoist made by the Daybrook Hydraulic Corp., Bowling Green, Ohio, has a 7-inch cylinder, a 29-inch stroke, and an oil capacity of 34 quarts. Its rated capacity under an 8-foot body is 16,000 pounds. Trussed gussets give the cylinder longitudinal as well as horizontal support. The total stress of the load is transferred directly

into the bearing areas instead of the center of the trunnion shaft. This exclusive Daybrook feature is designed to eliminate the chance of a bent trunnion shaft and to assure long trouble-free service.

The Daybrook steel body is of all-welded construction, 96 inches long and 58 inches wide, with the sides 33½ inches high, and front and tail-gate 41½ inches high, giving an approximate capacity of 4 cubic yards. Completely rounded front corners, backed by hardwood fillers and covered with steel wearing plates, assure complete dumping. The wearing plates are solidly welded to prevent moisture getting to the hardwood fillers. All of the hardware is of steel and completely welded for strength and dependability.

More information on Daybrook Hi-Dumper hoists and steel dump bodies will be found in a new illustrated folder SL1 which will be sent to readers of CONTRACTORS AND ENGINEERS MONTHLY who write direct to the manufacturer and mention this news item.

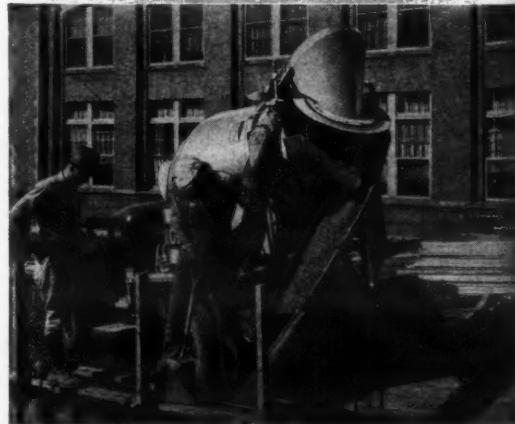
Yes Sir.

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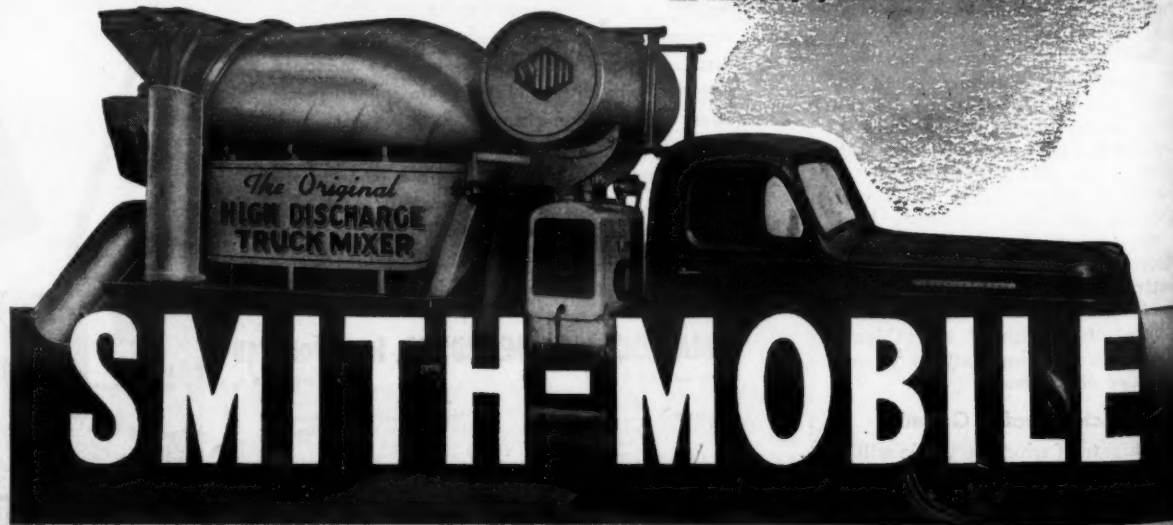
Ready-mixed concrete operators everywhere are playing safe by using dependable, job-tested Smith-Mobile Truck Mixers and Agitators. They KNOW Smith-Mobile fills the bill. They like its many time-saving, cost-reducing features. Backed by almost a half-century of specialized mixer building experience, Smith-Mobile is now entering its 8th year of quantity production. Instead of periodically introducing "new models", Smith has always been committed to a policy of constant improvements and refinements. That's why Smith-Mobile is today the LAST WORD in truck mixer design. Get the facts! Ask for Catalog No. 198-C.

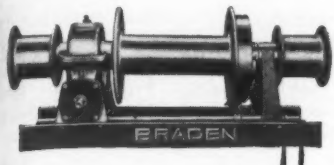
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CONTROLLED DISCHARGE

Just one of Smith-Mobile's many job-tested features. The illustration above shows a Smith-Mobile discharging directly into forms. Operator is getting just what he needs for this particular job — discharge, fast or slow, under perfect control and without segregation.





The Braden M12-18B heavy-duty truck winch, originally designed for the armed forces, is now available for civilian use.

Varied Winch Models For Truck Mounting

The M series of truck winches, made by the Braden Winch Co., 1001 East Admiral Blvd., Tulsa 3, Okla., ranges in sizes from 6,000 to 100,000-pound capacities, providing a model for practically any handling job. Every winch in this series is sold with the company's guarantee and is registered in the name of the purchaser.

Models M3-7 and M3-10 for use on $\frac{1}{2}$, $\frac{3}{4}$, and 1-ton trucks are designed for all light-duty jobs. They have adjustable Timken tapered roller bearings and are equipped with long-life adjustable fully automatic safety brakes. They are furnished complete with one-speed-forward and one-reverse power take-offs and all driving parts. For mounting back of the cab, on trucks with dump bodies, tanks, or other equipment already installed, the Model MU3-10 is recommended. Model MU3-10F is designed for front-end mounting on trucks up to 1-ton. Either has a cable capacity of 1,050 feet of $\frac{1}{4}$ -inch cable or 475 feet of $\frac{3}{8}$ -inch cable.

For use on 1 and $1\frac{1}{2}$ -ton trucks, there are the M6-15, M6-15A, and M6-15B, all with a safe working load of 12,000 pounds and a 34:1 gear ratio. Model MU5-12 is an underslung model for mounting behind the cab and under the body. With the same basic features for power and safety, this model has a cable capacity of 900 feet of $\frac{3}{8}$ -inch rope or 500 feet of $\frac{1}{2}$ -inch. An underslung model for front-end mounting on $1\frac{1}{2}$, 2, and $2\frac{1}{2}$ -ton trucks, the Model MU5-12F is suited for construction and erection work, pole setting, and similar jobs where front-end A-frames or gin poles are used. Model M12-18B, with a safe working load of 25,000 pounds, was originally designed for the armed forces. Since this winch has been made available for civilian use, it has proved to be one of the most popular in the entire Braden line, the manufacturer states. Model M12-18B comes complete

with two and one power take-off and has, as standard equipment, the new oil-cooled fully adjustable safety brake, claimed to be a new achievement in truck-winch safety.

Models 81 and 91-C are for use on 3 and 4-ton trucks and are designed for very heavy-duty rugged service. Model 81 has a safe working load of 50,000 pounds and 91-C, 100,000 pounds. These winches are made to keep tremendous loads safely under control without danger or risk of damage to the truck.

Further information on this line of Braden truck winches, as well as on the power take-offs with which they are equipped, is found in an 8-page illustrated bulletin, copies of which may be secured direct from the manufacturer by referring to this item.

Discharged Veterans To Be Aided by AED

Officials of the Associated Equipment Distributors have already swung into the task of putting into effect a policy, agreed upon at the recently concluded semi-annual directors' meeting, relative to the employment of returning veterans in the construction and road-building machinery industry. According to H. O. Penn, of New York, AED President, this nation-wide program is aimed at "providing new and constructive opportunities for returning veterans in every section of the country, as the nation's largest program of highway construction and all post-war construction requiring the use of heavy equipment gets into momentum".

This program calls for setting up state representatives of AED, one in each state, working within the geographical pattern of AED's fourteen regional units and in conjunction with the organization's Committee on Employment of Discharged Veterans. The members of this committee are: A. F. Garlinghouse, Garlinghouse Bros., Los Angeles, Calif., Chairman; Morton R. Hunter, Hunter Tractor & Machinery Co., Milwaukee, Wis.; R. R. Nixon, Nixon-Hasselle Co., Chattanooga, Tenn.; R. H. Carter, Virginia Tractor Co., Richmond, Va.; A. E. Hahnan, The Tractor & Machinery Co., Inc., Atlanta, Ga.; A. F. Sersanous, Loggers & Contractors Machinery Co., Portland, Ore.; E. W. MacAllister, MacAllister Tractor Co., Indianapolis, Ind.; Harry Hush, Griffin Equipment Corp., New York City; and John H. Gorman, Tractors,

Inc., Providence, R. I.

This group is preparing an extensive list of categories of jobs or possible jobs in the construction-machinery industry. Each state representative assigned by AED to the employment-of-discharged-veterans program will co-operate with U. S. Veterans Employment Service and other official govern-

ment representatives concerned with this problem, in an effort to place veterans in positions fitting their physical and mental capacities.

A seven-year road program, to cost approximately £1,750,000, has been proposed by the Post-War Development Committee of Tanganyika, in Africa.

MEMO

Re: SNOW REMOVAL

Looks like Haiss High Capacity Loading is the answer to our snow problem, too.

H.C.P.

The Haiss Model 75W Snow Loader digs . . . breaks-up and loads wet, dry or frozen snow at better than 10 yds. a minute. Clutches and gears in oil bath cannot freeze.

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GEORGE HAISS MFG. CO., INC.
Canal Place & E. 142nd St.
New York 51, N.Y.

PORTABLE CONVEYORS * LOADERS * CLAMSHELL BUCKETS

ROLLER BEARINGS and "LIFETIME" LUBRICATION



MAKE STEERING EASIER — and — SAVE SERVICING with

MECHANICS Roller Bearing UNIVERSAL JOINTS

The high speeds of today's rubber-tired tractors have made the hard steering and the need for frequent lubrication of plain bearing universal joints inadequate and out-of-date.

MECHANICS 1 RA Roller Bearing Steering Joints, using heat-treated alloy steels, hardened and ground to precision and factory packed with lubricant for life, provide easy, long lived steering — without further lubrication. Minimum backlash permits accurate steering in row crop work. Modern design, utilizing stampings and brazing, results in a price you can afford.



Mechanics Universal Joint Division

BORG-WARNER CORPORATION 2026 Harrison Avenue Rockford, Illinois



EARTH is moving faster these days

in Trucks equipped with
Brooks LOAD LUGGER



... and 5 to 10 Detachable Dump Buckets

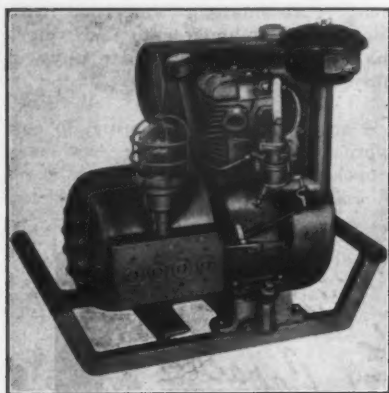
There's a new efficiency and a faster tempo today on material handling jobs wherever Brooks Load Luger is used. You can mount it on any standard chassis and make one truck do the work of many. Continuous hauling is what counts . . . no waiting for load-ups, no needless delays, no wasted manpower. This method shows big savings in quarry work, road building, excavating, loading riprap, stripping overburden. Use this economy system on your earth moving contracts!

Write for CATALOG

Brooks EQUIPMENT AND MFG. CO

Distributors in all Principal Cities

708 Davenport Road, Knoxville 8, Tenn.



A direct-connected U.S. Motors Corp. portable generator mounted on a light-weight steel carrying frame.

New 1,500-Watt Plant For Portable Power

A new 1,500-watt 120-volt ac or dc portable electric generating unit has been added to the line of engine-driven

plants ranging from 1/2 to 75 kw made by United States Motors Corp., Oshkosh, Wis. This Model 1,500 P has an air-cooled L-head rope-starter engine.

Vibration is eliminated by carefully balanced design to match all moving parts, by having parts and bearings of ample size, and by not overloading the engine. The mounting is either a rigid field frame with tube handles for carrying, or a light two-wheel trailer.

Form P44 contains illustrations, specifications, and general data. The manufacturer will supply a copy to readers mentioning this illustrated text.

The Story of Shovels: Their Part in the War

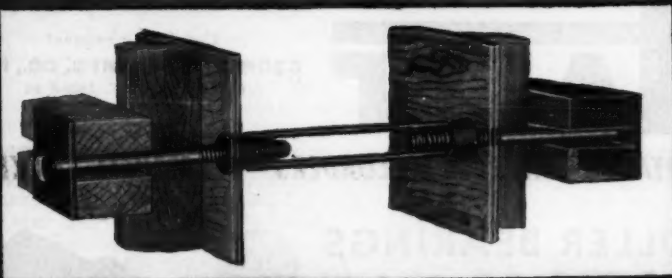
The second of a series of booklets under the title "In War and Peace, Progress Starts With Excavation" has been published by Bucyrus-Erie Co., South Milwaukee, Wis. This 36-page illustrated booklet contains dramatic photographs of 3/4 to 2 1/2-yard shovels, draglines, and cranes, presenting the "shovel

story" in the same graphic style that was used in the first brochure under this title to tell the "tractor-equipment story".

The book describes the basic part excavation has played in the past in building the modern standard of living all over the world. It tells how dirt-mov-

ing prepared the ground work for defense in America, aided in the construction of advanced bases, and is used on the fighting fronts. Finally, the book shows how progress in the post-war period must start with excavation and tells something of what may be expected from Bucyrus-Erie in the future.

RICHMOND TYSCRUS SPEED HEAVY CONCRETE WALL FORM CONSTRUCTION



Richmond Tyscrus are—

- High strength, light weight, form-tying devices with a range of sizes from 6,000 lbs. to 30,000 lbs. per tie safe load rating.
- Equally adaptable to plumb and battered wall construction. Use of Tyzones to spread form work for required wall thickness is optional.
- Easily assembled by workmen as all of the threaded members have coarse, fast acting, self-locking threads.

Forms strip easily leaving a clean wall surface when Richmond Tyscrus are used. The bolts (Tylogs) do not bind. Embedded Tyscrus Coils can be used for convenient form anchorage or scaffold support.

RICHMOND OFFERS—without obligation, consultation on best of ties and details of application to your form work; estimates on job requirements and recommendations on specific form problems.

RICHMOND WORKING PARTS—reusable accessories for Tyscrus including Tylogs, Tyzones and Flat Washers are furnished.

RETURNABLE FOR FULL CREDIT
—no rentals charged.

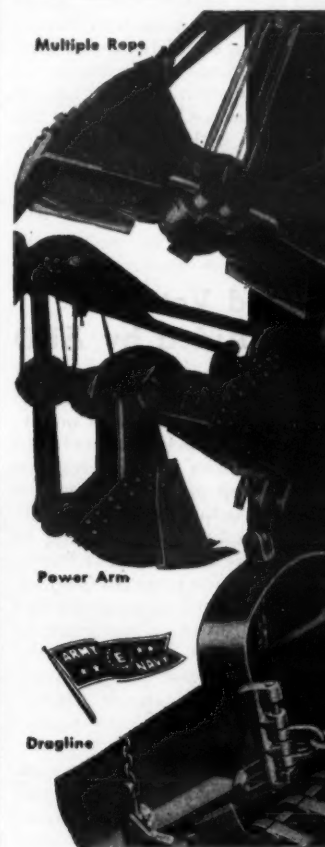
Form-Ty Engineering Guide
on Request



RICHMOND SCREW ANCHOR COMPANY, INC.

816 LIBERTY AVENUE, BROOKLYN, N. Y.
MANUFACTURING SINCE 1911





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Williams

BUCKETS

You get better performance . . . more dependable performance from Wellman buckets—they're welded rolled steel construction . . . Sturdier, less breakage.

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. . . rolled more efficiently, more economically with the only tandem roller in which the engine is mounted crosswise . . . !

- Only clean air enters radiator
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3 Wheel Rollers—6 to 12 tons
Tandem Rollers—3 to 17 tons
3-Axle Tandems—9 to 17 tons
Trench Rollers.



BUFFALO-SPRINGFIELD

The Buffalo-Springfield Roller Co.
Springfield, Ohio

The Oldest and Largest Builder of Road Rolling Equipment in America



There's a place for everything in this home-made case. The removable tray holds a welding blowpipe, cutting attachment, eleven welding heads, and six cutting nozzles.

Case for Carrying Welding Apparatus

You Can Protect Valuable Welding and Cutting Tips And Accessories by Making A Box in Your Own Shop

MANY welders have wanted, at one time or another, a toolbox for their welding and cutting apparatus. With a little care in planning, a tailor-made carrying case can easily be built which will hold any given combination of oxy-acetylene equipment without wasting any space. The carrying case illustrated in the accompanying photographs was made of 10-gage sheet with all joints welded. It was simple and inexpensive to make, yet was carefully designed to accommodate all the equipment required by the operator who was to use it. The dimensions of this particular box are 24 inches long, 12 inches wide, and 17½ inches high.

The inside of the hinged lid holds 50 feet each of oxygen hose and acetylene hose and a pair of goggles. The hose is coiled around special hooks made of ¼-inch steel rod bent to shape. Two handles, also made of ¼-inch rod, fit over the coiled hose to hold it in place and are snapped into two steel clips. The goggles are held against the lid in the center of the coil of hose by two more spring clips.

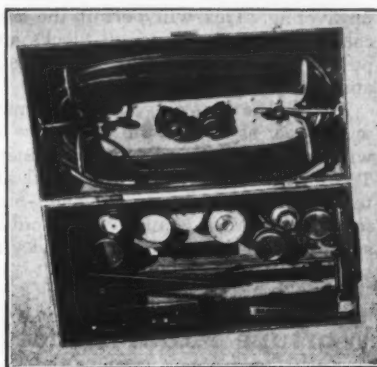
The bottom of the case is fitted with a tray that rests on small brackets welded into each of the four corners near the top. This particular tray was made to hold one Oxweld W-17 welding blowpipe with eleven welding heads of different sizes and one Oxweld CW-23 cutting attachment with six different cutting nozzles. Careful spacing of the various pieces was required to fit all this equipment into such a small area. The welding blowpipe handle, fitted with the cutting attachment and the smallest nozzle, was mounted as a unit at the top edge of the tray by means of a spring steel clip. The eleven welding heads were nested as shown in the photograph and held by the nut ends in recesses on a wooden cleat fastened to the tray. The tip ends were held by a wooden strip with a hinge at one end and a small hook at the other. The other five cutting nozzles were fastened by spring clips in the corners of the tray. Two knobs allow the tray to be removed easily from the box. A pair of welding gloves can be placed on top of the tray before closing the box lid.

A block of wood in the bottom of the case was recessed to hold an Oxweld R-65 oxygen regulator and an Oxweld R-66 acetylene regulator. These were placed face down to protect them against damage from objects falling on the dials. Holes also were cut in the block of wood to receive a can of Brazo flux, a can of cast-iron flux, and a small

box for drills and extra flints. The remainder of the bottom panel is divided to hold a wire brush, a lighter, and about 20 pounds of assorted welding rods. Strips of sheet metal were cut and bent to form hooks and were welded to the inside walls of the box below the tray. These hooks hold two 2-inch C-clamps, two 3-inch C-clamps, an acetylene-cylinder wrench, a hose wrench, a regulator wrench, and a slag pick.

The completed case was equipped with a hinged clasp to secure the lid, and with three lifting handles, one at each end and one in the center of the lid. The few hours of spare time used in making a carrying case like this will more than make up for the time normally wasted in looking for the right nozzle or wrench on the job. When a welder from your shop is rushed out to an emergency job in the field, it gives him a great deal of confidence to know that all of his gas-welding equipment is packed up in one place and he only has one box to carry.

Illustrations, courtesy of Oxy-Acetylene Tips.



In the bottom of the carrying case are two regulators, two cans of flux, various tools, and an assortment of welding rods.

Highway Debt Less Through Refunding

In spite of a debt reduction of \$9,100,000 during the war, South Carolina is in a better financial condition today than before the war started and is preparing

for large-scale post-war road construction. The reason for this is the refunding of \$4,000,000 of bonds for the purchase of the John P. Grace Memorial Bridge. The new bonds carry interest of only 1 per cent whereas the old outstanding bonds carried an interest rate of 3 per cent, so that the Department will save \$1,185,000 in the 10-year period required to pay off the debt.

Commissioner J. S. Williamson of the South Carolina State Highway Department reports that the State is prepared to match Federal funds for the first year of road building when work is resumed and that South Carolina will receive more than \$6,000,000 annually for three years under the new Federal-Aid Act.

The State Highway Department is reviving pre-war plans for a Highway Department office building, to be constructed near the State House in Columbia, in line with other state office buildings. The structure, planned in 1939, can be financed by a Federal loan and grant, will have four and one-half floors, and be built of stone.

CLEAR THE WAY FOR NEW CONSTRUCTION

WITH

Thor

PAVING BREAKERS

THOR FEATURES THAT SPEED UP HEAVY DEMOLITION . . .



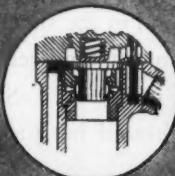
4-BOLT BACK HEAD

Gives maximum strength and rigidity when prying or when leverage action is applied to the breaker.



LATCH-TYPE RETAINER

Simple, efficient. A spring detent holds latch retainer in closed position. Operator has only to press down on retainer with his foot to insert or release tool.



POSITIVE, SHORT-TRAVEL TUBULAR VALVE

This actuates a block-type piston, minimizes vibration and makes machine easier to handle. Also assures reliable performance with low air consumption.



No. 25 Heavy Duty Thor Paving Breaker

BUILT FOR HEAVY DUTY . . .

DESIGNED FOR FAST, EASY HANDLING

Thor Breakers pack the power to make fast work of toughest demolition jobs—pavements, walls, columns, piers, foundations, etc. Operators enjoy the smooth, easy handling of Thor Breakers that is due to improved balance and freedom from unnecessary vibration. Together, these features assure more work in less time with less effort—at a definite saving in job costs.

Strength, rigidity and longer life are guaranteed by alloy-steel drop-forged construction . . . Thor Breakers have the extra stamina and capacity to handle the toughest jobs day after day at minimum operating and maintenance costs. "Measured air"—an exclusive Thor feature—provides maximum power for peak efficiency.

For complete information about Thor light, medium and heavy duty paving breakers and other Thor contractors' tools, write for Catalog 42-A.

INDEPENDENT PNEUMATIC TOOL COMPANY

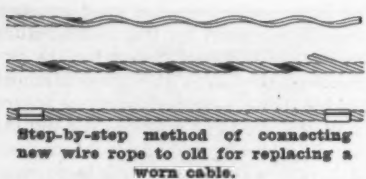
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Branches in Principal Cities



Method of Reeving Your New Wire Rope

When replacing an old and worn wire rope with a new one, on any type of machine which requires pulling the new rope through blocks, over sheaves, and onto drums, here is an idea which will save not only time and temper but also money and profanity.

From the end of the old rope, unlay and remove four of the six strands to a distance of about 2 to 3 feet. Similarly, remove two of the six strands of the new rope to be installed. Splice, or more properly speaking "lay", the two together and tape the end to prevent

unraveling. This will permit the new cable to be pulled through blocks and pulleys and reeved rapidly, accurately, and easily.

This can be done only with preformed wire rope, as this is the only type of wire rope with strands which lie inert. To remove the seizing wires and attempt this procedure with non-preformed wire rope would invite trouble, since ordinary rope, so cut, would virtually explode.

War-time Maintenance On County Highways

With a huge portion of the nation's war goods being produced in the Detroit area, the Wayne County road system has been subjected to especially heavy use. The concrete roads have required a large amount of patching and other maintenance to compensate for wear caused by the heavy loads that are a necessary part of war production.

In addition, the gravel roads and in particular the subdivision streets have assumed an importance hitherto unknown, in that vast numbers of war workers have taken up residence in outlying subdivisions. Because of the fact that these subdivision streets in general are improved to only a minimum standard, it has required a great deal of effort, and during bad seasons considerable ingenuity, to maintain access to these workers' homes.

During the fiscal year ending November 30, 1944, a total of 18,259 square yards of 10-inch concrete was placed for patching pavements in Wayne County. This work was facilitated to a great extent by recently acquired truck-mixers operating from the new central charging plant located at Wayne Yard. Seal coats, consisting of tar and fine gravel, were added in many places as a means

of protecting the surface of older pavements from the ravages of water and ice. All other routine maintenance, such as crack filling, Mud-Jacking, shoulder graveling, and grading, were carried on throughout the summer season as thoroughly as man-power and equipment permitted.

Many miles of secondary gravel roads and subdivision streets were widened and improved by resurfacing during the past fiscal year. A total of 135,000 cubic yards of gravel was used in this work.

On all types of roads, an important item of preservation is the adequacy of the drainage. It is a matter of continuing necessity to clean ditches, storm sewers and catch basins, provide new means of outlet for old ditches, and establish new ditches as obstructions occur due to housing developments or other causes.

MODEL HM-7429

Installed on engine for Air Compressor

Use Hour Meters on mixers, graders, tractors, bull dozers, pavers, crushers, etc.

PRODUCTIMETER HOUR METERS

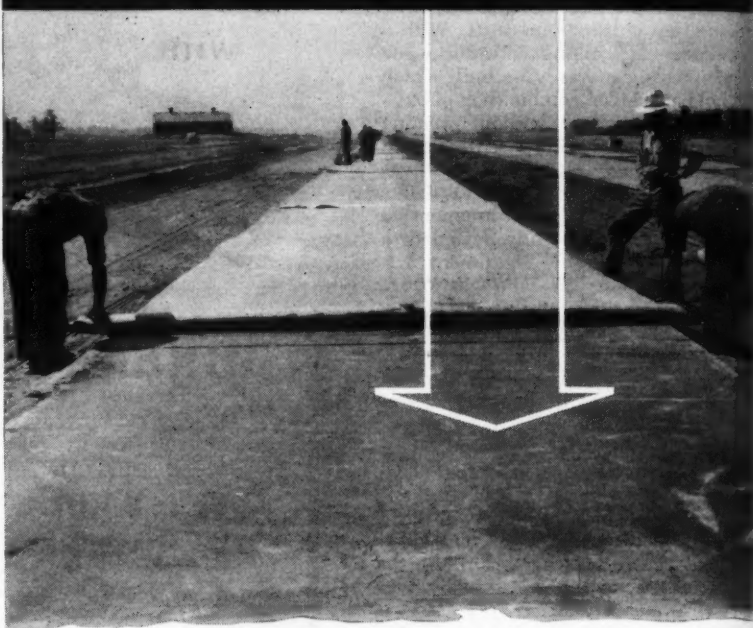
for internal combustion engines

You can know positively the hours of operation of gas or Diesel engines when Hour Meters are installed on them. A series of reduction gears in the meter converts the crankshaft speed into hours of running time. I. e. the normal speed of an engine running 60 minutes will register one on the meter. Readings thus obtained provide a basis for maintaining engine efficiency, increasing years of service, estimating costs and rental charges.

Send for Catalog 20 giving details

DURANT MANUFACTURING COMPANY
1976 N. Buffum St., Milwaukee 1, Wis.

98° TEMPERATURE... the Slab STILL WET after 96 hrs. with SISALKRAFT CURING Blankets



Not only was moisture sealed in during the first crucial 24 hours... but when the Sisalkraft blankets were rolled back 96 hours later, the slab surface was still wet... the finished surface hard, clean... ready for use, no dirt to blade, litter to remove, or scraping required.

Sisalkraft blankets are quickly and easily laid by two men... require no watching or sprinkling... can be used over and over again... save time, labor, money... assure A-1 curing and unmatched protection.

Found in the specifications of over 40 State Highway Departments and recognized as the country's No. 1 concrete curing agent... Sisalkraft is equally at home for general, all 'round job protection.



War production has restricted immediate availability — but after the war, as before, the Sisalkraft dealer organization will be ready to serve you in 48 states.

Manufacturers of SISALKRAFT, FIBREX, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT

General Utility Loading Device—



The TRUK-LODER SCOOPS HOISTS LOADS

Fills truck in 2-3 minutes
—in full view of driver

For all makes and models of trucks
Territory open for responsible distributors. Write for information.

Versatile • Economical • Efficient • Removable

The Truk-Loder enables the truck driver to within the range of the smaller contracting do as much as 15-20 men with hand shovels, companies and smaller communities.

The Truk-Loder will do most of the operation. For those who require a shovel for a few tons of a large and costly shovel—loading days, or for a few truck loads at a time, the dirt, gravel, crushed stone, street patch material—Truk-Loder is a most practical unit, since by terial, snow, leaves or refuse. The operation removing two hinge pins, it can be detached are economical and the Truk-Loder is priced in only a few minutes.

TRUK-LODER CO., TIFFIN, OHIO

INVEST IN WAR BONDS AND STAMPS!

Two Dredges Removed 2,350,000 Cubic Yards

(Continued from page 6)

pull itself forward on the main winches after which the spuds are lowered and digging resumed.

Auxiliary equipment on the Illinois includes a diesel engine manufactured by R. A. Lister & Co. of Dursley, England, which powers a 15-kw 120-volt generator, supplying the dredge with electricity. Boiler feed water is obtained from an evaporator on the dredge. On the port side forward is located a small wooden work bench which holds vices and small tools for minor maintenance work. The dredge is also equipped with a Lincoln electric welder.

A crew of 25 men living aboard the Illinois worked three 8-hour shifts; an average of 5,000 yards of material was dredged in a 24-hour day. Captain A. Munroe Alford is Master of the dredge Illinois.

Hydraulic Dredge Vicksburg

Following the clamshell dredge on the Vermilion River contract came the hydraulic dredge Vicksburg, built in 1940. This dredge has a steel hull of 5/16-inch plates and measures 130 feet long x 34 feet wide x 8 feet deep. It has a 22-inch suction and a 20-inch discharge with a 50-foot ladder which has a width of 14 feet as it leaves the bow of the dredge, and tapers to a 6-foot width at the cutter head. The ladder is supported by a 42-foot A-frame.

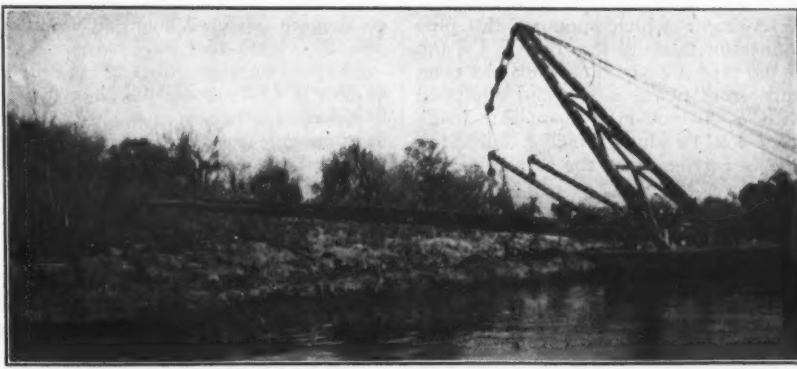
The prime mover on the Vicksburg is a Worthington 750-hp diesel engine located near the port side towards the stern. This engine drives the main pump which is placed about 45 feet back from the bow and 5 feet to starboard of the center line of the dredge in order to counterbalance the weight of the main engine. The driving connection between the engine and the pump is made by thirty-one rubber V-belts. The engine operates at 180 rpm while the pump turns at 315 rpm.

The main pump, of McWilliams design, has the discharge at the top. The pump casing is plain cast steel, weighing about 3½ tons, and had its interior hard-surfaced with a 3/16-inch coating, while it was on location, by a Lincoln and a Westinghouse electric welding machine. A 62-inch two-vane impeller was used in the pump for the bulk of the dredging. When there is the possibility of driftwood and logs coming into the suction line, a two-vane impeller, with its greater opening, is preferred to a four-vane impeller which can be put to better use when the character of the dredging is known to be clean and free from large solid bodies.

On this job the discharge line of the Vicksburg seldom exceeded 850 feet in length, with a 20-foot lift at the spill barge on the end of the line. With the 62-inch two-vane impeller, material could be economically pumped through 1,400 to 1,500 feet of discharge line; if necessary, a 58-inch four-vane impeller could be installed in the pump and a discharge line 2,200 feet long could be used.

Auxiliary Power

Starboard of the main engine is a Worthington diesel of 100 hp which serves as an auxiliary, and a 200 hp Worthington diesel is located astern of the 100-hp auxiliary. The 200-hp diesel drives a Westinghouse 135-kw 250-volt generator which in turn operates a 200-hp Westinghouse electric motor for the cutter head, and a 50-hp Westinghouse electric motor for the spud hoists, the anchor booms, and the swing lines. The generator also drives the water pumps, located behind the main engine, and the fans. The electric output of the 200-hp diesel and the 100-hp auxiliary can be



C. & E. M. Photo

The spill barge which worked with the Vicksburg hydraulic dredge carried 110 feet of pipe to deposit the fill behind the spoil banks, shortening the pontoon line and eliminating a land line.

synchronized and controlled from a switchboard located astern of the main engine.

The cutter motor is located at the base of the A-frame and drives the 5-blade 6-foot-diameter basket-type cutter which encircles the suction line. The 22-inch suction pipe is hung from

the bottom of the ladder and boards the dredge through a rubber connection 12 feet long. The dredged material is carried back to the pump through a 22-inch-diameter 5/8-inch-thick steel pipe which has now successfully withstood two years of service. Directly in front of the pump is a 30-inch-square man-

hole, the top of which can be raised when a log or other foreign object must be removed from the line ahead of the pump. The heavy cover of this manhole is lifted by a 3-ton Yale hoist running on an overhead monorail. The pump itself can be removed by a 5-ton Wright hoist on the same monorail which goes through a 12-foot-wide door on the port side.

Working Equipment

At the bow of the Vicksburg are two steel booms, 70 feet long, one to port and one to starboard, at the end of which are sheaves through which run cables to 3-ton anchors which are usually placed on the shore on both sides of the river. These booms can lift the anchors and move them ahead as the dredge progresses. By swinging on these lines, the dredge is capable of digging on a 200-foot front, or 100 feet on each side of the center line of the cut. A 7-drum Sargent hoist raises the bow ladder, operates the port and star-

(Concluded on next page)

New...rugged...war-tested

WORTHINGTON

MOWING EQUIPMENT

ready to serve you with
efficiency and economy

A long line of Worthington machinery is in use all over the world. Thousands of cutting units have been manufactured for our Air Forces and those of our Allies. Like the bombers and fighters that fly from Worthington cut airfields, our machinery has developed and improved — fast! War experience has tremendously increased our mowing and maintenance "know how."

This experience now comes to you... in the form of mowing equipment with a "pedigree" — rugged gang-mowers born in peace, developed in war, looking forward to a peacetime future on the highways of the nation, keeping shoulder and island turf in the best possible condition.

We stand ready to serve you. Won't you write us for full details about new Worthington Mowing Machinery, or for advice about your particular mowing problems.



THE ARMY-NAVY "E" PENNANT (with two stars) flies over our plant as a tribute from the Armed Forces to our employees for their fine war production record.

Worthington Distributors in 59 principal cities
throughout the United States and Canada

WORTHINGTON MOWER COMPANY

STROUDSBURG, PENNSYLVANIA • Established in 1914



Two Dredges Removed 2,350,000 Cubic Yards

(Continued from preceding page)

board swing lines, raises and lowers the port and starboard stern spuds, and handles the port and starboard anchor booms.

The two stern spuds are placed outside the hull, 17 feet center to center, are 57 feet long, made of 17 x 18-inch steel section, and weigh 10 tons each. The starboard spud is the walking spud, while the port spud is the digging spud and is down when the dredge is working.

Operations of the Vicksburg are controlled from the lever room in the bow of the dredge. Here is the vacuum gage which, on the Vermilion River work, showed an average of 16 inches of vacuum on the suction line taken in front of the pump. Pressure on the discharge line, which is taken in back of the pump, varied from 30 to 40 pounds. If the pressure falls, the vacuum rises, indicating to the operator that the suction line is plugged. Two other gages indicate the amperage on the ladder hoist and the cutter motor. If the cutter head meets a stump, log, or exceptionally heavy cutting, a circuit breaker on the wall of the operator's room cuts out at 750 amperes, letting the operator know that he must move away from the obstacle.

From his deck house the operator can also see the gage on the A-frame which indicates the depth at which the cutter head is working. This gage consists of a 4-inch guide running up the A-frame and carrying a small rectangular piece of metal mounted on a roller that goes up and down past the division marks on the guide as the cutter head is raised or lowered.

On the starboard side of the Vicksburg, across from the main engine, is a small bench with a sheet-metal top containing a bench vise, a hand drill, and other small tools for minor maintenance operations. At the stern of the dredge, behind the switchboard, is a Youngstown-Miller oil purifier which takes the used oil from the various pieces of equipment, cleanses it, and puts it back again in service. The dredge carries a 9-day supply of fuel oil in three tanks having a combined capacity of 9,000 gallons; the Vicksburg consumes an average of 1,000 gallons a day.

Discharge Line

The 20-inch discharge line, $\frac{3}{8}$ inch thick, leaves the pump at the side, gains the deck through a door on the port side, and continues down the port deck to the stern of the dredge. If this pipe wears on the bottom and begins leaking it can be turned over and patched by welding, an advantage of having the pipe out in the open where it can be easily inspected. From 20 to 40 per cent of solids are pumped through the discharge line of the Vicksburg which can average 800 to 900 yards an hour over a 24-hour day without straining.

The discharge leaves the dredge at the stern port corner for the pontoon line. Connection is made by means of three sets of 20-inch Mobile Pulley & Machine Works ball joints which permit both vertical and horizontal movement. Each 50-foot length of pipe is supported by two 48-inch cylinders, 18 feet long, held together at each end by a 10 x 12-inch timber strongback, 30 feet long, fastened to the cylinder by a $\frac{3}{4}$ -inch-diameter bolt, 14 inches long. The 50-foot lengths of pipe supported on this pontoon system are connected by ball joints.

The pontoon next to the dredge has three cylinders and has been floored over to form a work barge on which material is piled. This pontoon also has

an A-frame which supports the pipe connection leaving the dredge. On top of the pipe a 20-inch catwalk has been built from two 2 x 10's and equipped with a 36-inch-high hand-rail made from 2 x 4's along which a telephone line is carried from the dredge to the shore.

Other Floating Equipment

The Vicksburg's crew of 65, working three 8-hour shifts, were housed and fed excellent meals on a spacious 140 x 30 x 6-foot wooden-hull quarter boat which gets its fresh water for drinking, cooking, showers, etc., from a steel-hull water barge 120 x 30 x 7 feet. Fuel oil for the dredge was pumped from an accompanying steel barge 70 x 28 x 7 feet, having a capacity of 950 barrels. Another steel barge 120 x 30 x 7 feet was used for storing many extra lengths of pipe, pump parts, and reserve cutter heads. This equipment, together with the cylindrical pontoons, was moved about and hoisted by means of a 75-foot A-frame derrick operated by a 20-ton

gas-engine-powered hoist, all mounted on a 90 x 35 x 7-foot steel barge.

Another rig useful for moving pipe is an 80 x 25 x 7-foot steel barge on which is mounted a Lorain crane with a 55-foot boom. The crawler tracks were taken off the crane and the base rests on three 8-inch I-beams, 18 feet long and spaced 26 inches on centers. This crane barge has more flexibility in pipe handling than the barge with the A-frame derrick.

A small wooden-hull barge, 30 x 15 x 6 feet, carries two tanks, one holding 600 gallons of kerosene and the other containing 800 gallons of gasoline. Another craft that sees a lot of service is a 35 x 26 x 4-foot welding barge. A small deck house 15 feet square on this barge contains a Westinghouse Flexarc 40-volt 300-ampere welder driven by a Chrysler 6-cylinder gasoline engine. Three shelves along one wall are stocked with welding rods. On the deck are two acetylene welding units, a 2-foot-square coal-burning forge, and a 100-pound anvil. A small table with a

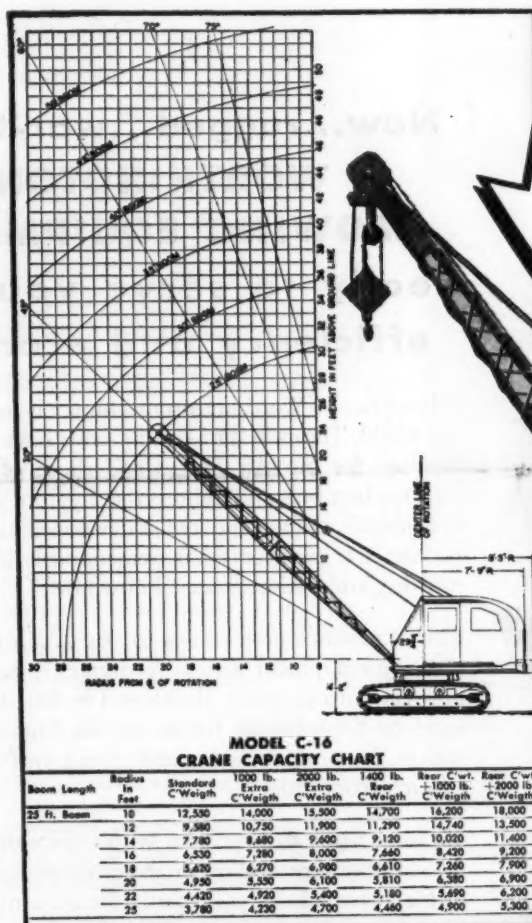
1½-inch-thick solid steel top holds a vise used when cutting pipe.

All these barges, together with the pontoons, are towed by three tenders: the 48-foot Southern Ponderosa powered by a 135-hp diesel engine and equipped with an A-frame and hand winch at the stern; the El Diablo, 35 feet long with a 55-hp diesel engine; and the Red Wing, 30 feet long and also powered by a 55-hp diesel engine.

Captain L. C. Gibbs is General Superintendent for the McWilliams Dredging Co. Captain Curtis Eagleson is Master of the Vicksburg, with Ernest E. Golden as Deck Captain.

McCrum Joins Steel Co.

Sidney E. McCrum, formerly Assistant to the Advertising Manager of Chicago Pneumatic Tool Co., New York City, has been appointed Assistant Advertising Manager of Wickwire Spencer Steel Co., New York City. Mr. McCrum has had extensive experience in advertising preparation and production.



Model TLDT-20 Truck-type Crane, 12-ton capacity



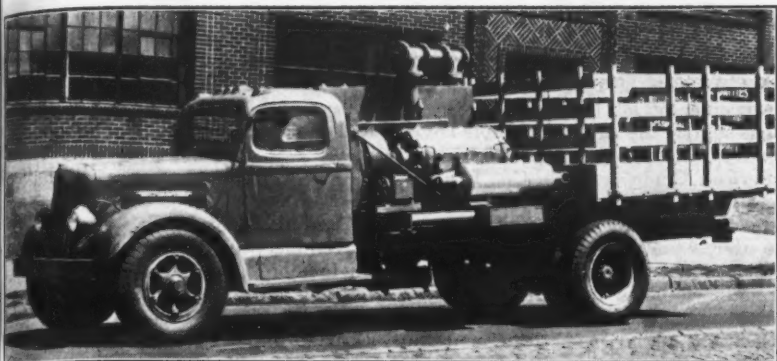
Model T-6-K Truck-type 1/2-yard Shovel, 6 to 8 ton Crane, Completely convertible.

MODEL C-16 MICHIGAN 1/2-YARD CRAWLER-CRANE

Faster production, greater operating ease, lower costs on all types of crane work—that's what owners and operators get with this combination of job-proven MICHIGAN-built crawler unit plus the air-controlled mechanism of the world-famous Michigan Truck-Type Shovel-Crane...

The complete story about Model C-16's tractor steering, simultaneous travel-boist-swing-crowd, quick convertibility, fingertip air-controlled clutches—and many other time-saving, profit-earning MICHIGAN features—is given in Bulletin CE-85. Write today.

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN



Several of these Model WA-22 White Super Power trucks will be used in rebuilding the Dnieprostroy Dam in Russia. The units are equipped with heavy-duty vacuum pumps for the Vacuum Concrete process.

Big Rebuilding Role Is Awaiting Trucks

Just as modern motor trucks have taken an outstanding part in winning the war, so, too, they will help in the reconstruction for peace. Already they are at work in devastated countries of Europe, where the tide of battle has passed and the gigantic task of rebuilding must be begun.

As an example of how American trucks will aid in the vast reconstruction job, the White Motor Co., Cleveland, Ohio, recently delivered several Model WA-22 Super Power trucks to Vacuum Concrete, Inc., of Philadelphia, Pa., for export to Russia where they will be put to use in rebuilding the Dnieprostroy Dam. The units are equipped with heavy-duty vacuum pumps and will be used in the Vacuum Process for speedy concreting.

American-made trucks have demonstrated their efficiency during the war years and have become known the world over. It seems logical to assume that the part American vehicles will play in rebuilding foreign countries will be an outstanding one.

Road Work to Relieve Local Unemployment

The demobilization of troops with 85 points or more and cut-backs in war industry are already causing localized unemployment. The best method of combating unemployment is to start construction projects immediately. We already have the 1944 Federal-Aid Act which, put into action, can absorb millions of men when work is at its peak. In order to make this act effective, however, a concurrent resolution must be passed by the Congress declaring that the war emergency has been relieved to an extent which justifies proceeding with the highway program. This would permit highway construction to start immediately through the release of Federal funds for road projects.

In an appeal to J. W. Robinson, Chairman of the House Roads Committee, for such a resolution, Charles M. Upham, Engineer-Director, American Road Builders' Association, states, "We do not claim that highway construction without limitation should start now, but we find an unemployment problem in the number of returning service men and the cancelling of war contracts. This comes at a time when war restrictions and lack of man-power have so limited maintenance that our streets and alleys will not be capable of serving the increased traffic of the post-war period. The resolution we ask for will both provide jobs and start things moving towards an adequate post-war highway system."

"With few exceptions, materials for highway construction are no longer critical. There is no shortage in such basic materials as cement, asphalt, tar, crushed stone, sand, and gravel. A substantial amount of road building can be carried on with a negligible amount of steel, although this situation is improving daily. While lumber is still critical, sufficient can be secured to

meet the small requirements for form work. Very recently the War Production Board has modified its controls over construction machinery, and with further military and manufacturing cut-backs the equipment problem will cease to exist.

"Highway construction can be ex-

tremely flexible, as new roads are required everywhere. It can be gaged to fit those areas where demobilization and cancellation of government contracts develop a local unemployment situation. By starting highway operations now, we can forestall serious unemployment later on, while at the same time we can meet one of our most pressing national needs; the rehabilitation of our streets and highways."

A Mixer Skip and Safety

A master mechanic was preparing to make repairs to the skip of a 1-yard concrete mixer. He walked about under the skip, which was elevated about 5 feet without blocking. The dog holding the skip control lever released and the skip fell, striking the mechanic on the skull and killing him.

Need we point out that, of course, the skip should have been blocked or secured with a chain or cable before repairs were begun or anyone passed under it?

Diesel-Tractor Bulletin

A new 32-page catalog just published describes and illustrates the sturdy 113-hp diesel-powered Caterpillar D8 tractor and tells why it meets many exacting requirements of excavating, clearing, snow plowing, grading, and similar jobs. Possessing ample power for the heaviest scraper work, effective distribution of weight to prevent loss of traction, and a high average haul and return speed, this tractor is designed to do a job with a minimum of time out for maintenance and repairs.

Details of construction, operation, and lubrication are given in the bulletin, with numerous illustrations and diagrams of the tractor and the diesel engine that motivates it. Matching equipment and special attachments for use with the D8 are also listed.

Highway engineers and contractors who want to know more about this tractor should write to the Caterpillar Tractor Co., Peoria 8, Ill., requesting Form 8869. Just mention this review.

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State Doubles Cash For Highway Repairs

To repair damage to state highways caused by weather and traffic, the State Highway Commission of Kansas will spend twice as much this year as it did last year, according to a report of L. L. Marsh, Maintenance Engineer. Repairs and construction will extend over some 4,506 miles of highway at an estimated cost of \$4,560,133 this year. Mr. Marsh states, "The 'ifs' in the project is the ability of contractors to secure the necessary manpower and equipment. Also favorable weather is a vital factor."

"At the beginning of the year the Commission had under contract 563 miles of gravel surfacing and 259 miles of bituminous surfacing, to cost \$495,966. However, the last jobs awarded were not finished. During June work was started on about 787 miles of gravel and stone surfacing, and 1,322 miles of bituminous surfacing, at a total cost of some \$1,588,961."

"For the remainder of the year, the Commission hopes to put under contract 610 miles of gravel and stone surfacing, and 535 miles of bituminous resurfacing, at an estimated cost of \$855,000. The costs are only approximate, as they depend on how fast plans can be completed, and how soon contractors can get through with other jobs and move onto new projects."

"A total of 1,961 miles of gravel and stone surfacing and bituminous resurfacing, to cost \$2,939,930, is either under contract, ready to contract, or we hope to place under contract during the remainder of the year. None of this work is new construction."

"Before the end of the year, we intend to let contracts for reconstruction of 99 miles of bituminous mat at an estimated cost of \$382,000. This work will consist of tearing the present surfacing to pieces, reshaping the grade, cleaning out the ditches, and then laying a new surface on a semi-stabilized base."

A Safety Certificate For Wire-Rope Slings

A Certificate of Test and Registry is to accompany all types of wire-rope slings sold by the American Cable Division and Hazard Wire Rope Division of American Chain & Cable Co., Bridgeport, Conn. This is a new idea in the wire-rope industry. The advantage to the user is that the certificate furnishes a permanent record of the original strength rating of the sling, the safety factor upon which that rating was based, the actual proof load, and the condition of the sale. Each sling will carry a metal tag showing the registry number, the sling type, and the maximum load rating.

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AC Electric Power

The line of Katolight gasoline-engine-driven electric generators for providing on-the-job alternating current for lighting and for powering electric tools is described and illustrated in a new 12-page bulletin issued by Kato Engineering Co., 530 No. Front St., Mankato, Minn. The features of the various models and sizes of these generators, with specifications, are covered.

Copies of this bulletin may be secured by interested contractors and state and county highway department engineers direct from the manufacturer.

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Two-Course Hot-Mix On Old Concrete Road

Bituminous Concrete Used To Improve a 2.7-Mile Section of 40-Foot-Wide Dixie Highway

A SECTION of the 40-foot Dixie Highway, one of the early concrete pavements in Illinois, was improved recently by laying a bituminous-concrete surface on the old concrete road from Homewood southward for 2.7 miles. The work was done by the Gallagher Asphalt Co. of Thornton, Ill., at a total contract cost of \$108,790.02, which included the cost of metal shoulders and increased base thickness. Built in 1917 as an 18-foot pavement and widened in 1928 to 40 feet, this heavily traveled highway was in some sections so rough that a leveling course of hot-mix was put down to smooth out the major irregularities before the binder and surface courses were laid.

First, however, all old bituminous patches in the pavement were removed by an Adams power grader to prevent subsequent bleeding into the new paving. Cracks that had been poured with tar or asphalt were cleaned out with picks or mattocks; otherwise they too might soften and cause fat spots in the new surface. A truck next went over the road, dropping enough sand-asphalt mixture to fill in these cleaned-out cracks. When the cracks were filled and hand-tamped, a pressure distributor applied a prime coat of emulsified asphalt, EA-1, at the rate of 0.06 gallon per square yard, using a 10-foot spray bar. All paving operations were done in four strips along the 40-foot road. The prime coat was applied 48 hours before the binder course by the A. C. Johnson Co. of Joliet, Ill., which filled its pressure distributor with asphalt at Chicago Heights about 2 miles from the south end of the job.

Hot-Mix Courses

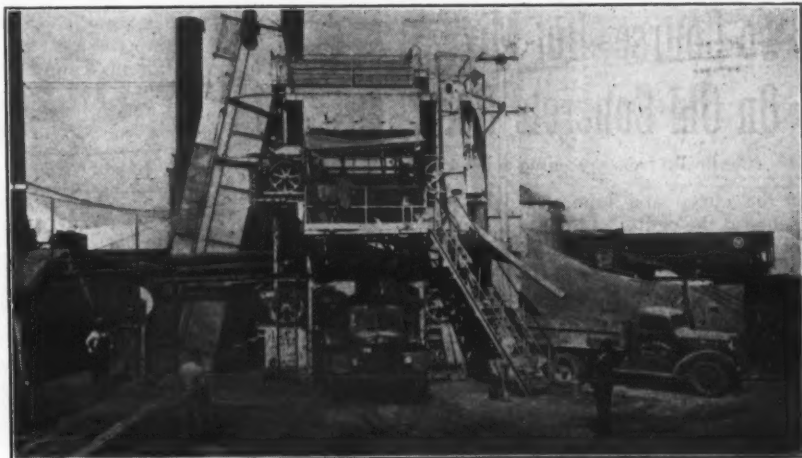
The leveling course, which was the same mix as the surface course, was put on by a Barber-Greene Tamping-Leveling Finisher only in those areas where there were deep depressions, so the thickness naturally varied according to the amount of the mix needed to bring those sections up to grade. The binder course was then laid in 10-foot strips having a thickness of 1 3/4 inches loose which compacted under rolling to 1 1/2 inches. The surface course of like thickness was similarly laid immediately after the binder was rolled; it was then rolled, and the road was opened to traffic.

The black-top material was hauled from the Gallagher Asphalt Co. plant at Thornton, about 4 miles from the center of the job, by the Fransen Construction Co. of Chicago in seven International trucks with a capacity of 12 tons, or eight batches of 1 1/2 tons. On the binder course, the finisher moved along at a speed of 26 feet per minute and had a record run of 1,008 tons in one 9-hour day. When laying the surface course, the Barber-Greene finisher moved only from 12 to 15 feet a minute.

For the guidance of the paver operator, who worked from the right-hand side of the machine, a cord guide line was strung on stakes 2 feet off the edge of the concrete pavement and about 1 foot above it so that the operator could keep his machine always in line. A tell-tale rod on the finisher was kept moving along the string. The outside edge of the paver was run 1 1/2 inches in from the edge of the concrete base when constructing the binder course so that the lateral movement in the binder course caused by the rollers would dis-

place enough material to reach the edge of the concrete base but not waste it on the shoulder. Like the priming, the paving was done in four 10-foot strips. Each course was first rolled by a 13-ton 3-wheel Huber roller followed by a pair of 10-ton tandem Buffalo-Springfield rollers. Water applied to the rollers to prevent picking up the mix was supplied from a 600-gallon tank mounted on an International truck.

Twelve men made up the paving gang in the following distribution: a foreman, a paver operator, 3 roller operators, a driver for the water tank truck, 2 men on the pressure distributor, 2 rakers at the finisher, and 2 men for dumping the trucks into the paver. A pail of kerosene was carried along to keep the tools clean.



C. & E. M. Photo

Gallagher's asphalt plant at Thornton, Ill., has a capacity of 114 tons an hour.

Concrete Superelevation

In two locations at curves in the old road a cement-concrete course was placed prior to the bituminous work in

order to provide superelevation on the flat road surface. This course was as much as 2 feet thick at the outside edge (Concluded on next page)



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Two-Course Hot-Mix On Old Concrete Road

(Continued from preceding page)

of the curve and tapered down to 2 inches at the center of the road. A wood form was used at the outside, and since the concrete was soon to be covered it was only roughly hand-finished.

Asphalt Plant

The Gallagher plant at Thornton, on a siding of the Chicago & East Illinois Railroad, received the paving asphalt in tank cars from the Pioneer Asphalt Co. in Chicago, 20 miles away. The coarse aggregate came from the adjacent Materials Service Co. plant while the sand came from a neighborhood source, the Thornton Quarry Co. The aggregates were delivered to the plant in gondola cars and dumped into track hoppers from where they were picked up by an endless belt system. This belt system was laid out in the form of a cross, one arm being a belt for the fine, or lake, sand, and the other arm carrying the coarse or torpedo sand. Both these sand belts discharged at the center of another belt running at right angles which carried the stone aggregate. This blending conveyor system was operated by a G-E 20-hp motor which moved the belts along at the rate of 50 feet a minute.

The sand and stone were delivered to a 6-foot-diameter x 24-foot-long drier which was heated by three Hauck fuel-oil burners. The material was then raised by a bucket elevator to the 4 x 10-foot Symons vibrating screens in 1-inch, 1/2-inch, and No. 10 sieve sizes, after which it was stored in the hot bins before being weighed for mixing in a Standard Steel Corp. 1 1/2-ton pugmill. The lime dust, used in the surface course, came in bags and was unloaded into a hopper whence it was conveyed by bucket elevator to a separate bin for storage.

Alongside the drier was a fuel tank 20 feet long x 10 feet in diameter, having a capacity of 12,000 gallons. The asphalt was stored in twin tanks 32 feet 8 inches long x 7 feet 6 inches in diameter with a capacity of 10,000 gallons each. A 75-hp Scotch marine boiler, fired by fuel oil, furnished heat for the asphalt in the tank cars, kept the asphalt in the storage tanks at a temperature between 250 and 350 degrees F, operated the asphalt pump, supplied steam for the jacketed asphalt lines which ran in a continuous loop from the pump to the weigh bucket at the pugmill and back again, and operated the rams which opened the discharge gates on the pugmill. The drier and the pugmill were operated by a G-E 100-hp motor, with another G-E 150-hp motor in reserve. Employing eleven men and a foreman, this plant had a capacity of 114 tons an hour.

The materials used in the bituminous concrete for the Dixie Highway resurfacing project were mixed in the following proportions:

	Passing	Retained on	Percentages	
			Surface Mix	Binder Mix
Stone aggregate	1-inch	1/2-inch	...	35.0
Stone chips	1/2-inch	No. 10	58.0	35.0
Sand	No. 10	No. 200	30.8	25.2
Lime dust	No. 200	...	5.5	...
Asphalt, P.A.-1,				
60 to 70 penetration at 77 F			5.7	4.8
			100.0	100.0

In the pugmill the heated aggregate for binder was mixed dry for at least 5 seconds before the asphalt was added, after which all the ingredients were mixed for not less than 30 seconds more. For the surface course, the heated aggregate and mineral filler were mixed for at least 15 seconds before the asphalt was added, after which all the ingredients were mixed at least 30 seconds.

Quantities and Personnel

The new black-top surface is not



C. & E. M. Photo

Resurfacing on the Gallagher Asphalt Co. contract on the Dixie Highway south of Homewood, Ill., was laid in two courses. Here the Barber-Greene works on binder.

only a big improvement in riding quality but also in appearance over the old road which, starting out as narrow

pavement, had been widened several times over the years to 40 feet, and presented a kind of crazy-quilt pattern.

The major quantities involved in the contract were:

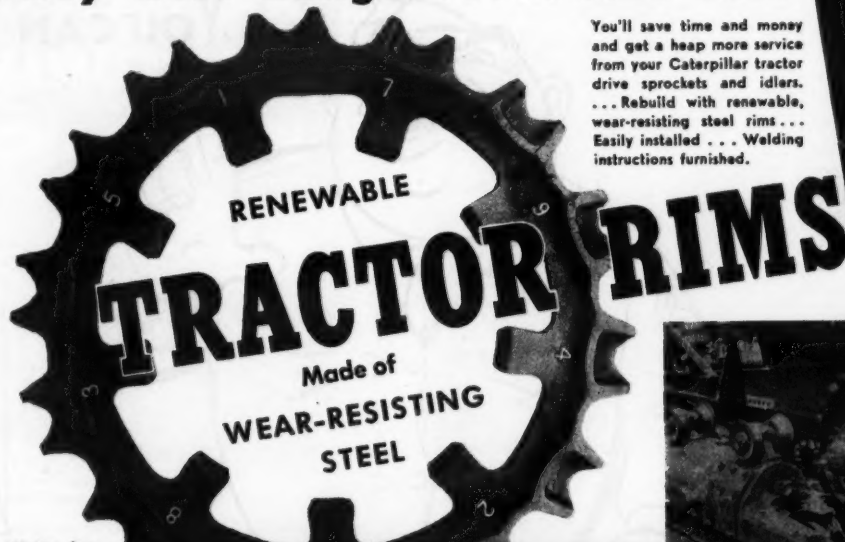
Bituminous prime coat EA-1	3,964 cu. yds.
Asphalt leveling course	123 tons
Asphalt binder course	5,677 tons
Asphalt surface course	5,415 tons
Cement-concrete leveling course (on curves)	635 cu. yds.

This bituminous resurfacing was done for the Illinois Division of Highways. Wesley W. Polk, Chief Highway Engineer. Work was started in May, 1944, and finished by October. A. C. Keppler was Superintendent for the Gallagher Asphalt Co. of Thornton, Ill., with W. M. Slattery, Foreman of the paving crew.

New Tractor Dealer

The Eastcoast Equipment Co., with sales offices, repair shops and service department at 31 North Ave., Garwood, N.J., has been appointed by the Allis-Chalmers Mfg. Co., of Milwaukee, Wis., as exclusive distributor in that territory of A-C tractors, industrial equipment, and allied products.

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Hydro Development Proposed in Georgia

Recent Report Shows Large Volume of Construction Is Justified by Economics; Study of Large Rivers

THE post-war era should produce extensive hydro developments in Georgia as a result of the very complete survey recently reported by Frederic R. Harris, Inc., Consulting Engineers, New York City, to the Agricultural and Industrial Development Board of Georgia. Careful studies were made of the major river basins, and these are compared with TVA on the basis of hydro-power, cost of construction, and cost of maintenance.

The state of Georgia has abundant surface and ground-water resources which will be adequate, if carefully conserved, to provide for future needs for hydro-electric power, for domestic and industrial water supplies, for navigation, and for other water uses within the state. These water resources may best be conserved by the construction of multiple-purpose reservoir systems which would be similar in many respects to those now operated by the Hudson River Regulating District in New York State, by the Brazos River Reclamation and Conservation District in Texas, by the Bureau of Reclamation, and by the TVA.

Nearly 9,000,000 acre-feet of effective storage can be developed within the state on the five major rivers, the Coosa, the Flint, the Chattahoochee, the Altamaha, and the Savannah. This effective storage is the equivalent of 4 inches of water on the drainage areas within the state, and would vary between 10 and 21 per cent of annual flows. The highest degree of regulation would be on the Savannah River by proposed reservoirs which would be capable of impounding 42.4 per cent of the annual flow of that river. By comparison, the TVA system has a present effective storage capacity of 15,000,000 acre-feet capable of storing one-third of the annual discharge of the Tennessee River. This storage is the equivalent of 7 inches of water on the drainage area of the Tennessee.

The river basins studied in this report have a total drainage area of 73,368 square miles, of which 54,445 square miles or 74.3 per cent lie in the state of Georgia. The state proper, with an area of 59,265 square miles, is the largest state east of the Mississippi. The five major river basins have drainage areas totaling 52,338 square miles, of which 39,580 square miles or 75.7 per cent lie in Georgia. This area within the state is equal to the drainage area of the Tennessee River at its mouth.

The present installed generating capacity in hydro-electric plants in Georgia is in the order of 350,000 kw. Potential and existing installations would total close to 2,000,000 kw, compared with the generating capacity of existing TVA plants of 2,000,000 kw and a total possible development to 3,000,000 kw. Roughly, therefore, Georgia has within its boundaries the power equivalent of two-thirds of the ultimate TVA system. The difference between Georgia and TVA capacities, with equal drainage areas, may be accounted for in part by the fact that the Tennessee is a continuous system, and the releases from storage reservoirs on the upper tributaries of the Tennessee increase the energy output of all downstream plants. The four major rivers of Georgia, on the other hand, must be developed as separate systems.

The estimated construction cost of the proposed new projects in round figures is \$317,000,000, which includes both new reservoir projects and additional

downstream generating capacity installations. The estimated annual cost is \$19,000,000 which includes charges of 3 per cent for interest and 2 per cent for depreciation, payments to counties in lieu of taxes, and other annual costs. Estimated operation and maintenance charges average \$1.50 per kw of installed capacity.

These estimated annual charges are in the order of those now used in connection with public power systems. They would not cover the state and Federal taxes and the interest rates which must be paid by private utility companies.

The total annual output of existing hydro-electric plants in Georgia is about 1,600,000,000 kw-hours, or 4,500 kw-hours per kw installed capacity.

The combined output of possible new Georgia installations would be 5,280,000,000 kw-hours. If the estimated annual cost of \$19,000,000 is all charged to power, the unit cost of generating energy at the station switchboards would be 3.6 mills per kw-hour. Some charge, however, may be made to flood control, navigation, and water supply. Assuming that 15 per cent of the total annual cost may be charged to these uses, the unit cost of generating energy at the station switchboards would be reduced to about 3.1 mills per kw-hour.

The latest report on the Savannah River by the U. S. Army Engineers reflects recent advances in the planning of multiple-purpose reservoir systems. The Savannah River Plan appears to make the best overall use of the water resources of the basin. Final system power studies may show that the Clark Hill Plant on the Savannah River could be operated to advantage on a higher load factor than indicated by the U. S. Army Engineer Report and that the construction cost could be reduced by



"He doesn't like to bark his orders more than once."

the cost of the excess capacity.

Order of Development

Plans for the development of the other major river systems of Georgia
(Concluded on next page)

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Hydro Development Proposed in Georgia

(Continued from preceding page)

are not as far advanced as the plans for the Savannah River. A general aim in future investigations will be to increase the effective reservoir storage on each river system. Increased storage is especially needed on the Altamaha to make this river more attractive as a source of power. When compared on the basis of existing plans as sources of low-cost hydro-electric energy, the most desirable order of system development would be (1) the Chattahoochee River, (2) the Coosa River, (3) the Flint River, (4) the Savannah River, and (5) the Altamaha River.

The generation of hydro-electric energy will be the most important function of multiple-purpose reservoir systems in Georgia. Other uses in the order of economic importance will be the conservation of water supplies, the regulation of low-water flows, and the control of floods. Recreation, the control of stream pollution, soil conservation, and possibly irrigation are important supplementary uses.

Water-Supply Conservation

The conservation of water supplies could be augmented by the Clark Hill Reservoir and by a multiple-purpose reservoir constructed above Atlanta on the Chattahoochee River. The Clark Hill Reservoir will improve the quality of Savannah River supplies by providing a minimum release at Augusta of 5,300 cfs. This increase in low-water flow would help to check salt-water encroachment in the river at Savannah and would improve the quality of the available supply from the river.

A reservoir located above Atlanta could increase the low-water flow of the Chattahoochee from 400 cfs to somewhere between 1,800 and 2,000 cfs. Atlanta's domestic, industrial, and steam-plant requirements could total around 800 cfs by the year 1960. A multiple-purpose reservoir located above Atlanta would provide an increment storage of 34,000 acre-feet necessary for Atlanta's needs for about one-third of the cost for which this storage could be developed in a single-purpose reservoir constructed solely for water supply.

Economic Justification

Clark Hill Reservoir on the Savannah River, Roswell on the Chattahoochee River, and Allatoona on the Etowah River, a tributary of the Coosa, offer attractive possibilities for the investment of either state or Federal funds. Direct monetary benefits from power and water supply should be ample to meet all operation and maintenance charges, to amortize allocated costs within reasonable periods of time, and to pay 3 per cent interest on the investment.

Indirect benefits and more general flood control, navigation, pollution abatement, wild-life conservation, and salinity control should be sufficient, according to the report, to justify Federal allotments for these purposes.

Various U. S. Army Engineer estimates place the ratio of total annual benefits to total annual costs somewhere between 1 and 2, with the probable ratio for each project falling close to 1.50. Each of these projects will have about the same order of economic desirability. As a basis for comparison, the value of energy was assumed to be 4 mills per kw-hour at the station switchboards, 85 per cent of the first cost was allocated to power, and total annual costs computed at 6 per cent of first costs.

Because of its advanced state of planning and design, Clark Hill Reservoir would probably be constructed first, at a cost of \$37,000,000, and take 705,000 kw-hours of the system load as compared to 672,600,000 kw-hours when integrated in the Savannah system. The unit cost at the station switchboard on an 85 per cent allocation basis would be 2.6 mills per kw-hour; annual flood-control and navigation benefits would total \$70,000 and power benefits \$2,800,000; annual charges would be \$2,220,000. The ratio of annual benefits to annual costs would be 1.3. Annual benefits would average 7.8 per cent of construction cost.

The first cost of Roswell would be \$13,000,000. If operated with existing downstream plants, the installed generating capacity of the existing plants would be increased somewhere between 50,000 and 100,000 kw, depending upon the position that the combined Roswell and existing-plant output would occupy on the system load curve. For the purpose of these studies, additions to existing plants were estimated to cost \$7,000,000.

Some reservoir projects in Georgia may be undertaken by Federal agencies and some by a state agency with Federal aid. Where the reservoir provides water supplies, low-water regulation for pollution abatement, power benefits at existing dams, and other benefits essential to sustained growth and de-

velopment within the state, the project might properly be undertaken by a state agency. If the same projects provided aid to navigation, flood control, and other regional benefits, Federal participation might be justified to the extent of that part of the project cost which could be allocated to these uses.



LACLEDE HIGHWAY STEELS

WIRE MESH

Slab reinforcement keeps cracks closed and holds slab together.

DOWEL SPACERS

Assures correct alignment and simple installation of shear dowels.

CENTER JOINT

For controlling longitudinal cracking of pavement.

Specify Them!!

REPORTED HIGHWAY RESEARCH INDICATES STEEL REINFORCEMENT IS NECESSARY IN PAVEMENTS FOR LONG LIFE AND LOW MAINTENANCE.

LACLEDE STEEL COMPANY

ST. LOUIS, MISSOURI

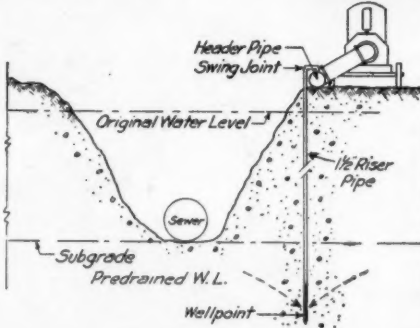
A Griffin Wellpoint Job!

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*eliminated
sheeting
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TRIPLED DAILY PROGRESS

The Contractor planned this sewer pipe job for tight sheeting and open pumping. He averaged 50 feet daily. Then 3 weeks of heavy rain raised ground water level to within 3 feet of the surface in the 15-foot cuts.



They immediately rented a three-pump GRIFFIN WELLPOINT SYSTEM, with a purchase option. After installation, they eliminated all sheeting for the entire job. Upon completion of the work, they had averaged 150 feet per day. They took up their option and bought the GRIFFIN WELLPOINT SYSTEM to start it again on another contract. For lower installation, operation and maintenance costs—it's GRIFFIN every time.

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your*

FLOOR
PROBLEMS

with PLASTIC ROCK!

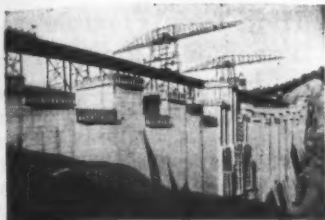
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Maxspeed electric hoists are used on high-speed cranes for outdoor construction.

New Electric Drive For Outdoor Hoist

A new hoist drive for cranes, known as the Maxspeed system, automatically "measures" the load so that it is hoisted and lowered at the maximum safe speed, yet prevents the handling of dangerous overloads. This system, announced by the Industrial Engineering Division of the General Electric Co., Schenectady, N. Y., is designed for use on either indoor overhead slow-speed cranes, or high-speed cranes of the type used in outdoor construction. The drive is particularly desirable for use on cranes where accurate hoisting and lowering are of utmost importance.

The drive operates from either alternating or direct-current incoming power. If used with alternating current, the drive consists of a generator, an unusually constructed cross-flux exciter, an ordinary constant-voltage exciter, all driven by an induction motor, and a dc hoist motor similar to the type used in crane-hoist installations except that its main field is designed for a variable separate excitation. If used with direct current, a shunt-wound dc motor drives the generator and cross-flux exciter instead of an induction motor, and the constant-voltage exciter may be eliminated. Regardless of the type of power used, it is the special construction of the cross-flux exciter and the way in which it is connected to

the other components of the drive that produce the unusual characteristics.

In operation, heavy loads are both hoisted and lowered at slow speeds, and light loads or the empty hook is hoisted and lowered at high speeds. Intermediate loads are handled at intermediate speeds, depending on the weight of the load. These speed changes are inherent in the drive and do not depend on the functioning of the control devices. All braking is accomplished electrically, the power being returned to the supply system instead of being dissipated in resistors. A solenoid brake holds the load when at rest.

The Maxspeed hoist drive is described and illustrated fully, with curves showing its characteristics, in a 12-page bulletin GEA-4302 which will be sent promptly on request.

Jack Maintenance And Repair Manual

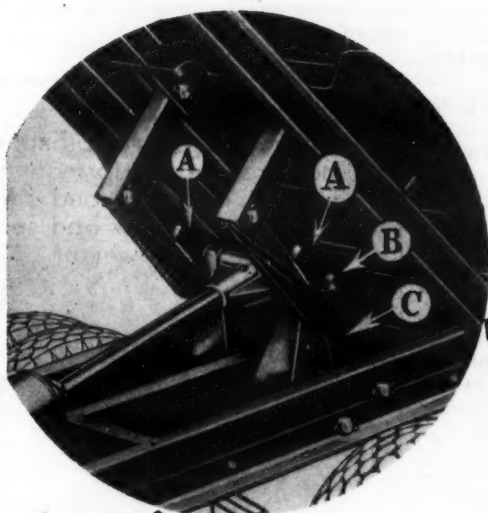
Users of both lever and hydraulic jacks will find practical help in their maintenance and care in the new 48-page Repair and Maintenance Catalog No. 45, just issued by Templeton, Kenly & Co., 1020 S. Central Ave., Chicago 44, Ill. The repair parts for the various types and sizes of Simplex jacks are illustrated and listed with a complete tabulation of interchangeable parts. This book not only speeds up the ordering of replacement parts, but also presents, with suitable illustrations, valuable suggestions for the maintenance, lubrication, and repair of jacks.

The types of jacks covered include automatic-lowering, mine-timbering, car-siding, geared, cable-reel, cable-tensioning, pole-pulling, mine-post-pulling, pull-rod, track, pipe-pulling and pushing, journal, rail-pulling and expanding, push-and-pull, mine-roof, and hydraulic jacks.

Copies of Catalog No. 45 may be secured from the manufacturer.



TRUCK EQUIPMENT



Anthony Features of design and construction are the result of firsthand knowledge of job needs and customer requirements.

For example: This X-ray illustration shows the DOUBLE ARM "POWER SPEED" LIFT of the SUPER Hoist. Proved in the field through years of service. The steady, constant change in movement of piston and lift leverage compounds the power to give Anthony hoists a tremendous lift advantage at the beginning of the lift, when LOAD IS HEAVIEST, and increasingly faster action as body goes up and load lightens—notice too, the "RUBBER RESTRAINING BLOCKS" inside of links. These prevent "over-run and kick-back", and greatly simplify controlling the load when dumping or spreading materials.



HOISTS and BODIES

FOR ALL

Motor Trucks • Six Wheelers • Semi-Trailers



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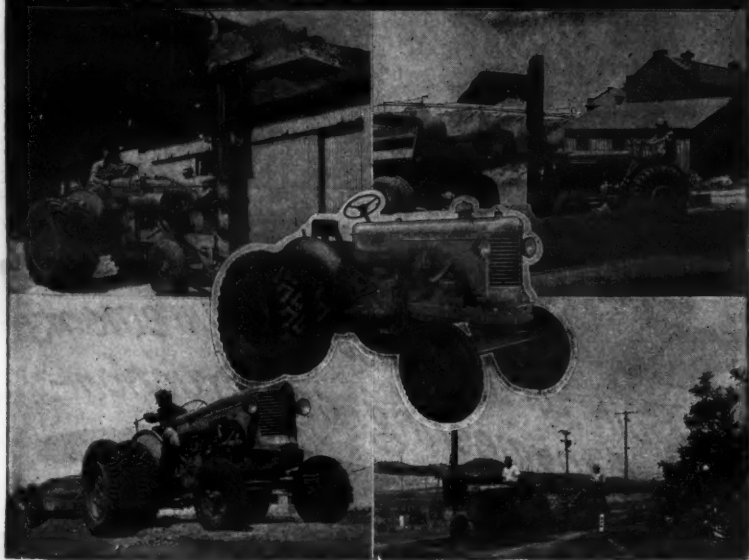
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ILLINOIS

"BUILT" to do the JOB



It's PERFORMANCE that Counts...

"Know-How" are small words but they have a big meaning in the manufacture of industrial tractors. "Know-How" and "Built to do the Job" are synonymous in building MM Industrial Tractors. The dependability, durability and low operating cost of MM Industrial Tractors is widely known. MM Industrial Tractors are built not only to pull graders, scrapers, packers and tampers but are also versatile enough to be adapted to loaders, cranes, snowplows and bulldozers. The short turning radius, good traction, high road speed, heavy-duty engines, special heavy-duty front axles, steering gears and counter weights make them ideal to "fit in" on the hundreds of jobs in any road or highway program. MM Industrial Tractors have a power range of from 27 to 64 brake HP on 70 octane gasoline and are built for real power without sacrificing operating economy and long life performance.

MODEL	ENGINE	BRAKE HP ON 70 OCTANE GASOLINE	FORWARD SPEEDS	MILES PER HOUR
RTI	3 1/2 x 4-4 cyl.	27	4	2 to 11
UTI	4 1/4 x 5-4 cyl.	48	5	2.2 to 18
GTA-I	4 1/2 x 6-4 cyl.	64	4	2.5 to 10

MINNEAPOLIS-MOLINE POWER IMPLEMENT COMPANY

MINNEAPOLIS 1, MINNESOTA, U. S. A.

Distribution of Funds For Community Plans

The Bureau of Community Facilities, Federal Works Agency, George H. Field, Commissioner, has been designated by Major General Philip B. Fleming, Federal Works Administrator, as the Bureau to administer the \$17,500,000 fund appropriated by Congress to aid states and their political subdivisions in the advance planning of post-war public works. The types of eligible public works include, among other non-Federal public works: sewer, water, and sanitation facilities; schools and other educational facilities; hospital and health facilities; other public buildings such as city halls, courthouses, police and fire stations, armories, community buildings, etc.; highways, roads, streets, bridges, viaducts, grade separations, and airports, for which other Federal funds are not legally available; parks and other recreational facilities; and miscellaneous public facilities such as transportation and port facilities, public docks, wharves and piers.

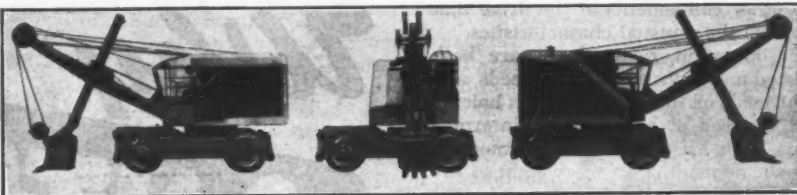
The amount which will be available to the public agencies of each state in accordance with the per capita formula has been announced and includes additional funds for states and territories to bring their apportionment up to at least one-half of one per cent of the total fund available for apportionment. While the total appropriation is \$17,500,000, 3 per cent is taken out for administrative expenses, leaving a total of \$16,975,000 available for apportionment. In addition the sum of \$1,171,819 is being held for discretionary apportionment.

DISTRIBUTION OF \$17,500,000 APPROPRIATION FOR PUBLIC WORKS ADVANCE PLANNING

	Per Cent Of State Population	Apportionment Of 90 Per Cent	Add'l Apportionment to Provide 1/2 of 1 Per Cent	Total Apportioned
Ala.	2.114	\$332,966		\$332,966
Ark.	.372	56,632	\$28,043	84,675
Calif.	1.454	222,135		222,135
Colo.	5.152	787,097		787,097
Conn.	.838	128,025		128,025
Del.	1.275	194,788		194,788
Fla.	.199	30,402	54,473	84,875
Ga.	1.416	216,329		216,329
Idaho	2.331	356,119		356,119
Ill.	.392	59,888	24,987	84,875
Ind.	5.892	900,150		900,150
Iowa	2.557	390,646		390,646
Kans.	1.894	289,356		289,356
Ky.	1.344	205,330		205,330
La.	2.123	324,341		324,341
Maine	1.764	269,495		269,495
Md.	.632	96,554		96,554
Mass.	1.359	207,621		207,621
Mich.	3.221	492,088		492,088
Minn.	3.921	599,031		599,031
Miss.	2.083	318,230		318,230
Mo.	1.629	248,870		248,870
Mont.	2.824	431,437		431,437
Nev.	.417	63,707	21,168	84,875
N.H.	.982	150,025		150,025
N.J.	.082	12,528	72,347	84,875
N.M.	.367	56,068	28,807	84,875
N.Y.	3.104	474,214		474,214
N.C.	.397	60,652	24,223	84,875
N.D.	10.056	1,536,305		1,536,305
Okla.	2.665	407,145		407,145
Ohio	.479	73,179	11,696	84,875
Ore.	5.154	787,402		787,402
Pa.	1.743	266,287		266,287
R.I.	.813	124,206		124,206
S.C.	7.386	1,128,396		1,128,396
S.D.	.532	81,276	3,599	84,875
Tenn.	1.417	216,482		216,482
Texas	.480	73,332	11,543	84,875
Utah	2.175	332,286		332,286
Vt.	4.786	731,181		731,181
Wash.	.411	62,791	22,084	84,875
W. Va.	.268	40,944	43,931	84,875
Wis.	1.998	305,245		305,245
Wyo.	1.295	197,844		197,844
Alaska	1.419	216,788		216,788
Hawaii	2.341	357,646		357,646
P. R.	.187	28,569	56,306	84,875
Totals	100	\$15,277,500	\$525,681	\$15,803,181

New Mobile Shovel Announced by Byers

A full-circle mobile one-man-operated 1/2-yard power shovel has recently been announced by The Byers Machine Co., Ravenna, Ohio. This Byers Traveler derives its name from its specially engineered heavy-duty lower chassis which provides mobility, four-wheel-drive traction, and steering under the control of the same man who operates the unit as a shovel or crane. The one-man control is claimed by the manufacturer as one of the features of this self-propelled mobile excavator; another is the short-coupled lower chassis which permits 360-degree shovel oper-



This new Byers Traveler is a mobile full-circle one-man-operated 1/2-yard power shovel.

ation.

The Traveler's speed of travel, traction effort, air braking, and hydraulic steering were all specially designed for this unit. Timken Detroit axles, Ross steering gear, and a Vickers hydraulic ram to augment hand steering control are employed. The operating machinery is said to be as modern as the lower chassis, with forced oil lubrication of all enclosed gears and with Airflex clutches in place of conventional ones. The manufacturer states that Airflex clutches offer operators new standards for convenient control of hoisting, crowding, and swinging.

The overall width of the lower chassis is 8 feet to meet state highway regulations. The wheelbase of 9 feet approximates the ground bearing length of most 1/2-yard shovel crawlers and permits digging over both the front and rear of the machine. Believing that the trend throughout the construction industry is towards rubber-tired mobility for heavy equipment, Byers has developed the Traveler to be in step with that trend.

Literature giving complete details on this new Byers Traveler mobile excavator may be secured direct from the manufacturer by referring to this item.

Old High-Type Flexible Pavement Conservation

The tenth in the series of booklets on wartime road problems issued by the Highway Research Board is a report on salvaging old high-type flexible pavements, with recommendations based on wartime restrictions, although they are general in nature and apply whenever the described conditions prevail. Patching, temporary maintenance, substantial resurfacing, and widening are the four methods presented, with emphasis on the first two while wartime conditions continue. Each method is described in detail, with tables and illustrations, and the appendix at the back of the book gives typical specifications for bituminous mixtures, taken from Public Roads Administration data.

Copies may be secured by writing to the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C., and asking for Bulletin No. 10 of Wartime Road Problems.

TRANSLODE Expansion and Contraction Joints have been giving excellent load transfer performance on thousands of miles of American pavements since 1932. Today's improved and simplified design retains the continuous base which makes installation easier and seals the joint against the infiltration of dirt from the soft subgrade. The weight of the joint has been reduced while the rigidity has been increased to make handling and finishing easier.



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STEEL PRODUCTS
COMPANY**

CHICAGO HEIGHTS, ILL.

Duff-Norton Jacks
Built for the special requirements
of engineering construction—

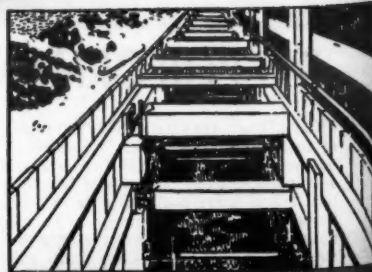
It takes husky, powerful equipment to stand up under the severe requirements of construction work. Duff-Norton Jacks are built to take it. Strong and dependable, they give you long service life under the toughest kind of conditions. There is a type and size for every requirement. Write for the Duff-Norton catalog giving specifications and descriptions of the complete Duff-Norton line.

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**LARGE and SMALL—
DUFF-NORTON JACKS
SERVE CONSTRUCTION**

From the time-saving Duff-Norton Trench Brackets to the large, husky, heavy-duty screw jacks, Duff-Nortons are doing essential jobs in construction projects everywhere.

Concrete Span Built For Dual Highway

(Continued from page 2)

Universal mechanical tie rods were used to hold the forms in place in the wall sections up to and including 18 inches wide. In forms built with a wider dimension, $\frac{3}{8}$ -inch-diameter rods with cat-head clamps were used.

To support the deck forms, falsework was erected consisting of 6-inch posts in four bents for each span. Each bent had eight posts, one to support each girder, which were spaced a little over 8 feet apart. Where the ground permitted, the posts were driven by a 2,000-pound drop hammer working in 20-foot leads from the boom of the Koehring crane. Otherwise they were set up on the rock in the creek bed and capped with 6 x 6-inch sections. The girder and slab forms were made from $\frac{3}{4}$ -inch tongue-and-groove stock.

Concreting

A batching plant was set up in a level field on the south side of the road at the bridge site. A wooden platform was built to hold the bags of cement which was purchased from the Cumberland Portland Cement Co. at Cowan, Tenn., in the southern part of the state, and transported 200 miles by rail to Powell, a nearby station on the Southern Railway, and hauled by truck the remaining 2 miles to the plant.

Tennessee River sand purchased from the Sangravel Co. at Knoxville was used for the fine aggregate, and was hauled from the city plant in trucks and stockpiled at the bridge site. The coarse aggregate was crushed limestone shipped by rail 20 miles from the American Limestone Co. quarry at Mascot, Tenn., to the station at Powell, where it was unloaded by crane into trucks which hauled it to the job. The aggregate was stockpiled and loaded into a two-compartment Blaw-Knox 16-ton bin by a Lorain 40 crane equipped with a 50-foot boom and a $\frac{3}{4}$ -yard Blaw-Knox clamshell bucket.

The sand had the following gradations:

Sieve Size	Per Cent Retained On
No. 4	0-5
No. 14	8-40
No. 48	70-95
No. 100	95-100

Following are the gradations of the crushed limestone:

Sieve Size	Per Cent Retained On
1-inch	0-5
$\frac{3}{4}$ -inch	25-50
$\frac{3}{8}$ -inch	75-90
No. 4	95-100

Water for the concrete was taken from Beaver Creek by a C. H. & E. 3-inch pump through 150 feet of pipe to two 500-gallon tanks built on a wooden platform alongside the cement storage. The concrete was mixed in two Jaeger 2-yard truck-mixers which first picked up the aggregate, and then pulled up to the storage platform where the cement was added. Water flowed by gravity from the overhead tanks into the truck-mixers, one of which was mounted on a Ford and the other on an International truck, which mixed the batch for four minutes.

The truck-mixers then crossed to the north side of the road where the concrete was discharged into a $\frac{1}{2}$ -yard concrete bucket which was picked up by the crane working along the creek bed and swung over the forms. It was chuted into place from a hopper with a U. S. Rubber elephant-trunk hose attached. Two Mall vibrators were used to prevent honeycombing along the walls.

An expansion joint of $\frac{3}{4}$ -inch bituminous material was set across the full width of the bridge at pier 2. In place of the $\frac{1}{2}$ -inch steel plates with $\frac{1}{8}$ -inch copper sheet between them which were used for expansion before the war, two

layers of Johns-Manville service sheet packing No. 60, $\frac{1}{4}$ -inch thick, were used between the deck girders and the bridge seat for expansion on abutments 1 and 2 and pier 2. A 5-foot sidewalk was built along the north side of the bridge.

Quantities and Personnel

The working crew included a superintendent and 15 men in the following capacities: 6 carpenters, 2 crane operators, 2 operators for the truck-mixers, 4 laborers handling the placing of the concrete, and a concrete finisher.

The major estimated quantities were:

Excavation	1,534 cu. yds.
Concrete	913 cu. yds.
Reinforcing steel	113,669 lbs.

The cost of this bridge and the double 10 x 6-foot concrete culvert constructed by the Alley Construction Co. of Bristol, Va., was \$67,000. C. C. Alley, a member of the firm, personally directed operations on the bridge, with Lonnie Phillips as Superintendent. L. P. Hoge was Resident Engineer for the Tennessee Department of Highways, of which

C. W. Phillips is Commissioner and W. T. Brooks is State Highway Engineer. The work was done in the First Division of which G. W. Prater is Division Engineer and J. B. Hawley, Division Construction Engineer.

Lumber Manufacturers

Issue Design Leaflet

The National Lumber Manufacturers Association has issued a leaflet showing how past editions of the Wood Structural Design Data series can be used under the provisions of the new "National Design Specification for Stress-Grade Lumber and Its Fastenings" (see page 65 of this issue). This leaflet is intended for temporary use, pending publication of a revised edition of the Wood Structural Design Data series to conform to the new specification.

Copies of the leaflet are available free to holders of past editions upon application to the Technical Division of the Association, 1319 18th St., N. W., Washington 6, D. C.

INDEX TO ADVERTISERS

Aerol Products Co.	33
Agerstrand Corporation	8
Aircraft & Diesel Equipment Corp.	58
Alth-Chalmers Tractor Division	73
Alloy Steel & Metals Co.	84
American Cable Division	23
American Conveyor Co.	12
American Steel Scraper Co., The	16
Anchor Coupling Co., Inc.	41
Anthony Co.	97
Armco Drainage Products Assn.	82
Associated Equipment Distributors	42
Austin-Western Co.	37
Barber-Greene Company	46
Barco Mfg. Company	83
Barrett Division, The	78
Bay City Shovel, Inc.	46
Beebe Brothers	20
Bethlehem Steel Co., Inc.	23
Bicknell Mfg. Co.	27
Brooks Equipment & Mfg. Co.	85
Bros. Boiler & Mfg. Co., Wm.	34
Bugurus-Erie Co.	72
Buda Company, The	40
Buffalo-Springfield Roller Co., The	86
Calelam Chloride Association	36
Carter Co., Ralph B.	55
Carver Pump Co., The	82
Caterpillar Tractor Co.	48
Calumet Steel Co.	46
C. H. & E. Mfg. Co.	28
Chain Belt Co.	26
Chevrolet Motor Division	79
Chicago Pneumatic Tool Co.	79
Clark Mfg. Co.	81
Cleaver-Brooks Company	91
Cliff Drill Co., Inc.	81
Coast Metals Inc.	69
Complete Machinery & Equipment Co. Inc.	45
Cannery Construction Co.	38
Continental Rubber Works	79
Cumner & Son Co., The F. D.	57
Davenport Boiler Corp.	54
DeSoto Foundry, Inc.	88
Detroit Diesel Engine Div.	52
Dodge, Division of Chrysler Corp.	34
Duff-Norton Mfg. Co., The	88
Durant Mfg. Co.	88
Electric Tampo & Equipment Co.	76
Erie Steel Construction Co.	85
Eucild Read Machinery Co.	81
Fairbanks, Morse & Co.	34
Festo Co., The	29
Ford Motor Co.	26
Fulton Bag & Cotton Mills	17
Gallon Iron Works & Mfg. Co., The	71
Gardner-Denver Co.	57
Gar Wood Industries, Inc.	24, 59
General Excavator Co., The	42
Goodall Rubber Company, Inc.	83
Good Roads Machinery Co.	32
Grimm Wellpoint Corporation	96
Gulf Oil Corporation	35
Hais Mfg. Co., George	85
Hayward Co., The	29
Hell Co., The	31
Heitzel Steel Form & Iron Co.	36
Hetherington & Berner Inc.	34
Highway Equipment Co., Inc.	79
Highway Steel Products Co.	98
Hobart Brothers Co.	40
Huber Mfg. Co.	81
Independent Pneumatic Tool Co.	87
Ingersoll-Rand Co.	17
Inslay Mfg. Corp.	76
International Harvester Co.	18
Iowa Mfg. Co.	15
Isaacson Iron Works	13
Jaeger Machine Co., The	45
Koehring Co.	65
Laclede Steel Co.	96
LaCrosse Trailer & Equip. Co.	14
Lansing Company	13
LaPlant-Chaste Mfg. Co., Inc.	11
LeRoy Company	64
LeTourneau Inc., R. G.	100
Lewis Equipment Co., H. W.	67
Lidgerwood Mfg. Co.	24
Lima Locomotive Works, Inc.	83
Link-Belt Speeder Corp.	18, 88
Linn Mfg. Corp., The	92
Littleford Bros., Inc.	69
Madsen Iron Works	33
Mall Tool Co.	92
Marion Steam Shovel Co.	25
Martin Machine Co.	42
Master Mfg. Co.	44
Master Vibrator Co.	44
McCaffrey, Inc., M. P.	94
McCaffrey-Huddock Tagline Corp.	82
McKernan-Terry Corp.	85
Mechanics Universal Joint Div.	85
Michigan Power Shovel Co.	93
Minneapolis-Moline Power Implement Co.	43
Mir-O-Col Alloy Co.	93
Mixer Manufacturers Bureau	93
Monarch Road Machinery Co.	46
Mondie Forge Company, Inc.	78
Murphy Diesel Co.	78
National Production Co.	99
Noble Company	44
Oliver Corporation, The	12
Onan & Sons, D. W.	30
Owen Bucket Co., The	53
Parsons Company, The	16
Pettibone Mulliken Corp.	63
Pioneer Engineering Works, Inc.	55
Richmond Screw Anchor Co., Inc.	86
Rockford Clutch Division	82
Rodgers Hydraulic, Inc.	68
Roeth Vibrator Co.	23
Rogers Bros. Corporation	75
Sageen Derrick Co.	71
Schramm Inc.	14
Seaman Motors Co.	5
Shunk Mfg. Co.	60
Sinclair Refining Co.	8
Siskliff Co., The	88
Smith Engineering Works	81
Smith Co., The Y. L.	84
Standard Steel Corp.	67
Sterling Machinery Corp.	9
Sterling Wheelbarrow Co.	76
Stoody Company	21
Sure Lite & Power Plants, Inc.	74
Templeton, Kenly & Co.	68
Texas Co., The	3, 38, 39
Thew Shovel Co., The	7
Toro Mfg. Corp.	47
Truckson Company	9
Truk-Loder Co.	30
Trucon Laboratories, The	30
Tuthill Spring Co.	28
Twin Disc Clutch Co.	44
Union Fork & Hoe Co., The	42
United Laboratories, Inc.	96
United States Motors Corp.	36
Universal Engineering Corp.	66
Victor Equipment Co.	66
Vulcan Tool Mfg. Co.	33
Walter Motor Truck Co.	60
Ward LaFrance Truck Div.	27
Warren-Knight Co.	32
Wellman Engineering Co.	86
White Mfg. Co.	80
Wickwire Spencer Steel Co.	29
Winpower Mfg. Co.	73
Wisconsin Motor Corp.	62
Wood Mfg. Co.	27
Worthington Sewer Co.	89
Worthington Pump and Machinery Corp.	20, 21, 75

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BACK THEM BUY BONDS

Mark well this button. It is worn by the men and women honorably discharged from the armed services. Though now in civilian clothes, let's not forget their service to our country and us. They still rate our every consideration.

Contractors *and* Engineers Monthly



Small, Light **TOURNAPULL** ... **A MONEY-SAVER** ON UTILITY JOBS REQUIRING SPEED & MOBILITY

FOREST SERVICE... To clean 2 to 100-yard slides on fire-fighting trails in San Gabriel Mountains, above Altadena, Calif., U. S. Forest Service uses this small Tournapull, spreads slide material along road surfaces, then carries excess dirt to stockpile. Extreme mobility enabled the Tournapull to travel 12 miles over highway, 6 miles up mountain to job, remove a 30-yard shale slide and return, all in 1 day.



◀ **LANDSCAPING**... G. H. Lowe Construction Company used utility size Tournapulls on Cedar Rapids Municipal Airport to "core out" between paving forms, hauled and spread the dirt for terracing and landscaping around administration building and hangars. These light, mobile rigs also removed foundation excavation stockpiles from inside new hangar, distributed it to grade and beautify grounds.

ESTATE AND PARK MAINTENANCE... At Boy Scout Camp Wokanda near Mossville, Ill., this Tournapull backfilled trenches, rebuilt and widened access roads, built trails, graded for tennis courts and recreational areas, improved drainage, did light clearing and general landscaping. One-man operation with ability to travel fast cross-country or along roads without damage, makes this small Tournapull ideal for construction and maintenance on parks, cemeteries, golf courses, large estates, etc.

◀ **GARBAGE DISPOSAL**... Fountain City Disposal Company of Knoxville, Tenn., uses a small Tournapull to spread earth over garbage dumped into erosion ditches. Former methods proved inadequate. As the Tournapull borrows earth, it cuts additional trenches for future disposal. New method provides earth seal during decomposition, meets State Board of Health regulations... same time, leaves badly-eroded land refertilized and leveled for future use.

ROAD MAINTENANCE... Green County, Ga., has a lot of small-yardage maintenance jobs widely scattered over its 750 miles of county roads. Principal work is "salting" red clay roads with "grey dirt". Because of Tournapull's ability to load, haul and spread — plus high-speed travel on or off-pavement between jobs — 2 of these rubber-tired rigs and 2 men handle as much maintenance as 4 dump trucks and 20 men. c-31



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Manufacturers of Tournapulls*, Angledozer*, Bulldozers, Tiltadozers*, Carryall* Scrapers, Power Control Units, Roosters*, Tournatrailers, Tournacranes*, Tournatrucks*, Sheep's Foot Rollers, Tournarope*, Tournaweld*, Tournalifts*.
*Trade Mark Reg. U.S. Pat. Off.
(Specifications subject to change without notice.)

The small, light Tournapull was developed for the Aviation Engineers to handle utility jobs in widely-scattered areas. Due to cutbacks in military requirements, a few are available for civilian use. They will make money on your small yardage projects. For lowest net cost per yard on your major, continuous production jobs, investigate the largest, job-proved Tournapull. See your local LeTourneau distributor TODAY.

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